RAILROAD GAZETTE

FRIDAY, JULY 19, 1895.

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Contributions.

The Crystallization of Steel.

PITTSBURGH, July 11, 1895.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The editorial on the crystallization of steel published in the *Railroad Gazette* of March 15 only reached me to be read yesterday, and, although rather late, I send you a word on a few of the points raised.

Mr. Howe put the question of crystallization in the right light in the discussion referred to, viz., that we cannot know the condition of a piece without breaking it, and if we break it we cannot very well test it afterwards; therefore, the question must remain theoretical. We do know that large coarse crystals and weakness are produced by bad heating and bad working. We say a piece will always break in its weakest part; therefore, if a piece contains large, weak crystals in one part, it will break through that part when strained, and then the coarse crystallization will be exposed.

In regard to the chain illustration: a chain is exposed to strains of extension, flexure, and some compression alternately, and often so close to the elastic limit, or a little above it, that it may be said to be cold worked. Now we know beyond question that while a certain amount of cold working does increase tenacity and compressive resistance, it reduces largely ductility and flexibility; it induces brittleness. This is every day knowledge that must be dealt with in cold rolling, wire drawing, etc. I never knew this cold working even when carried to destruction, to produce large, coarse crystals, and I never knew any person to make any such claim. Cold worked iron or steel that has become too brittle for further working, or for any use, may be made thoroughly tough and ductile again by annealing, provided the working has not been carried so far as to produce crushing or actual rupture of the particles, so an old chain, not yet ruptured, may be made thoroughly ductile again by annealing.

I agree with you that the discussion of change of crystallization from use, is fruitless and useless. The suggestion to adopt the word "fatigue" to express the strained condition referred to, strikes me favorably; it is probably as good an expression as we could have.

WM. METCALF.

Economical Design of Electric Light and Power Plants

TO THE EDITOR OF THE RAILROAD GAZETTE:

The following limited investigation of a point mentioned in the discussion by Mr. Geo. H. Barrus of a paper on coal consumption, read at a late meeting of the Boston Society of Civil Engineers, opens up a subject which deserves a larger consideration than it has yet received.

The arrangement of one of the most recent electric light stations (or electric *current* stations, as they would be now more properly called) in a large city brought a somewhat new principle into special prominence. It has long been observed that, owing to the fluctuating demand for electric current from a central station (which, though varying between wide limits, yet follows a somewhat definite law), the average consumption is very much less than the maximum capacity of the station, which, however, must be equal to the heaviest demand to be made upon it, even though this demand is but for a very short time.

This means that the equipment of such a station with boilers, engines and dynamos must be very much larger than would suffice for a steady load equal to the average demand, and that this portion of the plant must lie idle for a large proportion of the time. The earning capacity of this part of the machinery is therefore very small.

This fact alone accounts for the failure of many electric lighting companies to pay any dividends, since the larger part of the plant is for the most of the time unproductive.

Very serious study has been given to the problem how to increase the earning capacity of such a station, and partial success has been attained in several different directions. Were there no limiting conditions, the remedy for the difficulty would be simple and effectual, in one or another of the following ways, viz:

(1) Distribute the demand for electric current uniformly over the 24 hours of the day, by transferring the excessive requirement to some portion of the day where now there is power to spare.

(2) Accumulate a surplus when the plant is not taxed to its full capacity, to be drawn upon during the hours when the demand exceeds the limit of the average supply.

(3) Furnish the difference between the average and the maximum requirements from a part of the plant costing less than that portion which is constantly in use.

The first two suggestions would admit of the use of a generating plant of smaller capacity than is now employed, and the third, while requiring as large an outfit as at present, would cheapen the cost of that portion of the current included between the average and the maximum output, that is, of the portion which is produced at great expense, if not at an actual loss, because now used only a small portion of the time, in the busiest hours of the day.

It is manifestly impracticable to carry out the first proposition. In the majority of cases the use of the electric current could not be transferred to any other than the times it is now called for, the principal and largest requirement being for lighting, and this almost entirely by night. In a residential district, where the lighting begins when darkness comes on, the heavy demand ceases at from 10 to 12 o'clock p. m., with a small consumption through the whole night.

In a mercantile district, however, there is a demand both by day and by night, in stores, and, to a degree, in manufactories, for day lighting, beginning at from seven to nine o'clock in the morning, when such buildings are opened, and lasting until they close at night, usually from five to seven o'clock, after which very little current is required (except for street lamps) until the hour of opening next morning.

In a manufacturing district some lighting is required during the day, but within a few years there has developed a considerable and constantly increasing demand for electric current to furnish power for various purposes, where formerly hand labor was used, or where small, and therefore very uneconomical, steam engines were employed.

The great convenience, safety, ease of application and frequently considerable saving of expense when electricity is used, are advantages which, when they are thoroughly appreciated, will lead to much more extended and varied applications of electricity in manufacturing processes. This is especially satisfactory to a company supplying electric current, and such use is to be encouraged by all legitimate means, as it calls for the current at a time when the demand for lighting is at a minimum, and when, therefore, the proportion of the cost to the output is largest. The steadiest and most satisfactory load for an electric station is usually all-night street lighting. The next best is probably street-lighting where lamps burn till midnight, while still less desirable are street lights which are burned only when the moon does not shine, or is obscured by clouds.

In some stations electricity is required for all the uses enumerated above; the net result is a more even demand than where some of them are absent, but still very far from uniform.

There are three ways in which a station may be equipped for furnishing electric current, viz.; (1) With one or more generators of large size; (2) with a number of smaller units, which may be coupled together when necessary, or (3) by a combination of large and small machines.

The very great difference in the consumption of coal per horse-power makes the larger engines and generators far more economical than small ones, while their high cost adds greatly to the initial outlay.

In favor of the smaller machine is the less first cost, and the convenience of being able to shut off the machinery a little at a time as the demand for the current falls off, which is partly—sometimes completely—offset by the less cost of current generated by a large machine, driven by the most recent type of triple-expansion or compound-condensing engines, with jacketed steam cylinders, which produces a horse power with about 1 lb. of coal per hour, while small engines frequently require 6 to 8 lbs. The choice reduces, then, to this:

We may pay a large sum for a generating plant which will enable us to produce electricity cheaply, a considerable portion of which must lie idle a large part of each day, or buy an outfit at less cost, and very largely increase the consumption of coal.

In some stations a generating plant smaller than the maximum demand has been made adequate by supplementing it by a large storage battery to be charged by the surplus current which can be obtained when the requirements are less than the station can supply, and to be drawn upon during the hours when the demand is excessive.

This plan is worthy of much greater consideration than it has yet received; as it allows all the current used to be generated by a minimum amount of apparatus of the highest efficiency, running under the most economical conditions.

Another method is to furnish the largest and most constant part of the current from very efficient apparatus, and meet the extraordinary demand by the use of less costly, but less economical machinery.

Here seems to be the key to the soundest application of this principle, viz.:

Determine what will be the average and steady load on the station during the time when current is required, and purchase a plant of the most economical and efficient type sufficient to carry this load, together with a liberal allowance for the growth of business, and supply the remainder of the current from machinery of low cost, run so much of the time as is necessary to meet extraordinary demands. The limit of economy of this proposed arrangement is reached when the interest per annum saved in the less cost of the plant just equals the extra cost of fuel per year.

There is still room for the exercise of sound judgment as to the best size and type of machinery, and the proper arrangement of the station, and especially as to the proportion of the load which should be borne by each type of apparatus, and great care should be exercised not to spend too large a sum for apparatus which cannot be operated with economy, bearing in mind that the cost of installation is paid once for all, but the running expenses go on continually. When the two parts of the plant are in their proper proportions, the cost of producing electricity will be at a minimum and the profits of the station the greatest, so far as they are affected by this particular question.

The foregoing considerations apply to every station supplying electricity for lighting or power or for running street cars, or even to the pumping of water or the supply of steam power where the demand is irregular, but must be promptly met when it comes.

The *ideal* arrangement for an electrical supply station would seem to be a generating plant of the most economical type supplemented by a storage battery of sufficient size to carry that part of the load which exceeds the capacity of the station during all the hours such extra demand exists, and absorbing, during the hours when the outside load is light, the surplus which the plant can furnish, supplemented by a small amount of low cost machinery for the maximum demand during the heaviest portion of the day. Under such an arrangement it would sometimes be possible to shut down the generators altogether when no great quantity of current is required, and draw upon the storage batteries, thus still further decreasing operating expenses. This scheme would furnish a maximum supply current at a minimum cost.

In some places considerable business can be done in the sale of exhaust steam for heating purposes. In this case a regular and tolerably uniform supply would be probably desired, and here the storage battery plan would be very favorable.

GEO. W. BLODGETT.

The Physical Condition of the Cincinnati Southern.

We have recently received a copy of a report submitted last May to the trustees of the Cincinnati Southern Railway by Mr. G. Bouscaran, M. Am. Soc. C. E. The report is the result of an examination made by him to ascertain the physical condition of the property and the improvements made by the operating company under the provisions of the lease, from the beginning of the contract with the city of Cincinnati, Oct. 12, 1881, to June 30, 1894. The railroad was built by the city of Cincinnati and leased to the Cincinnati Southern Railway Company Oct. 12, 1881, for 25 years. The rental varies by periods of five years. For the first period it was $800,000 per annum, for the second $900,000, then $1,000,000, $1,090,000 and finally for the last period $1,250,000. The lessees pay in addition $12,000 yearly to defray the expenses of the Board of Trustees. At the expiration of the lease the property as it stands, including all betterments, reverts to the city.

We shall make an abstract of the report, giving it considerable space, as a good example of that kind of work as well as interesting information with regard to this particular property.

Roadbed.—The embankments have improved with age in firmness and stability, and depressions and deficiencies in width, defect of settling and erosion, are being corrected and the numerous slides between Ludlow and Roger's Gap which were a cause of great annoyance and expense for many years, have apparently reached a state of rest. The slopes of excavations are also more stable and many are now covered with grass. For two-thirds of the length of the road the ditches are clean (in May) and the right of way is generally clean.

Tunnels.—A total length of 15,911 ft. of tunnel is arched, of which 13,972 ft. has been arched by the lessees. The greater part of this arching is with stone masonry side walls; in some cases it is entirely of brick. Much of it is in wet tunnels, which is a severe test for the masonry. The work has stood well except an occasional soft brick.

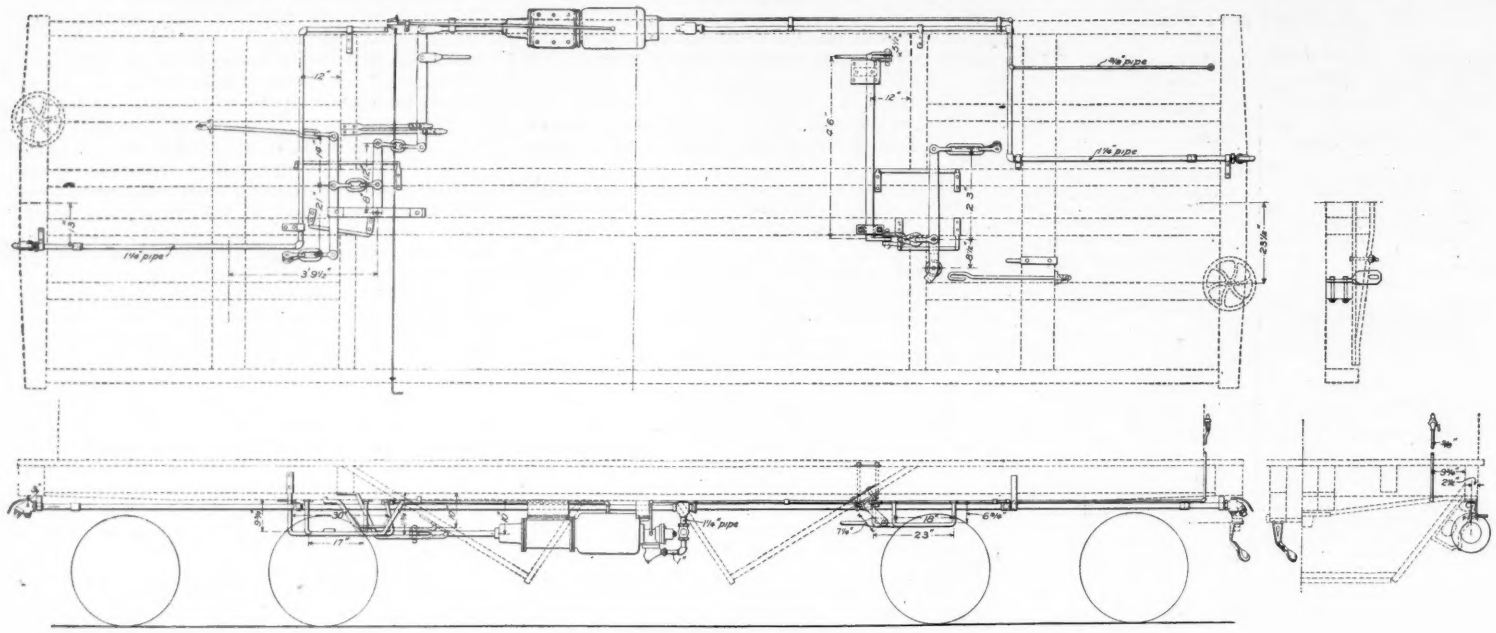
In a strip three or four feet wide at the crown of the arch the mortar joints are being dug out by cinders blown up by the exhaust. This is especially noticeable on grades and in some instances the bricks have fallen. A shield of cast iron or hard steel 4 ft. wide would protect the masonry, and at any rate some provision should be made to prevent further damage.

Tunnels aggregating 5,274 lin. ft. are now timbered and

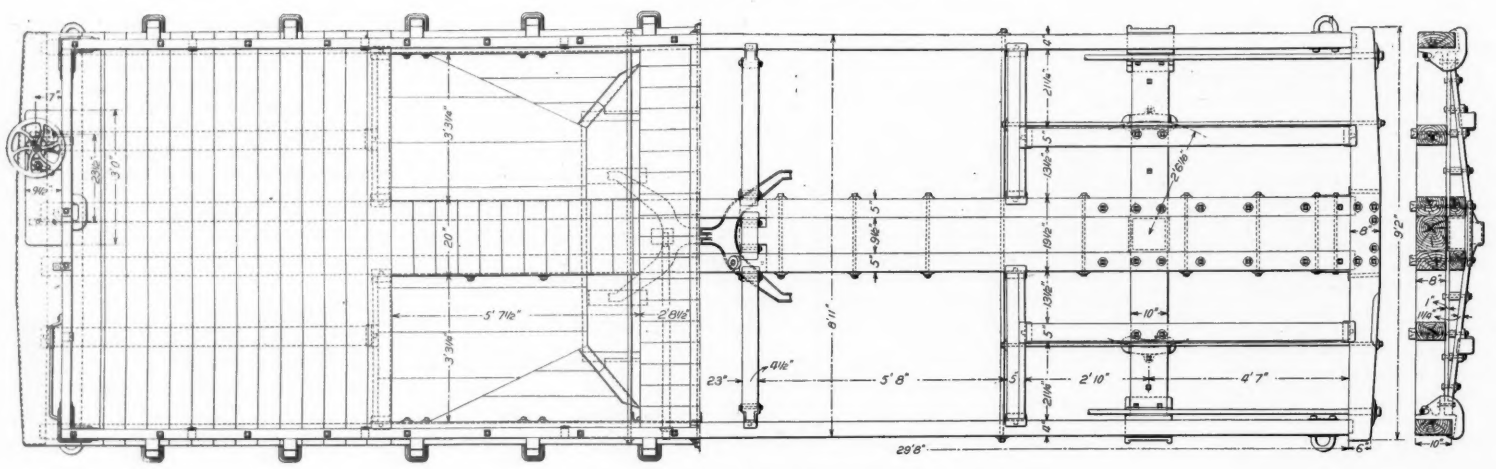
require arching. Tunnels aggregating 4,979 lin. ft. are untimbered and will probably not require arching. The limestone and sandstone in which they are excavated shows no sign of disintegration.

Track.—The gage of track was changed by the operating company in 1886 from 5 ft. to 4 ft. 8½ in. The original 60-lb. iron and 53-lb. steel rails have all been removed which rails are being returned to the makers in exchange for better ones. The company expects to lay 5,000 tons (42 miles) of new rail this year.

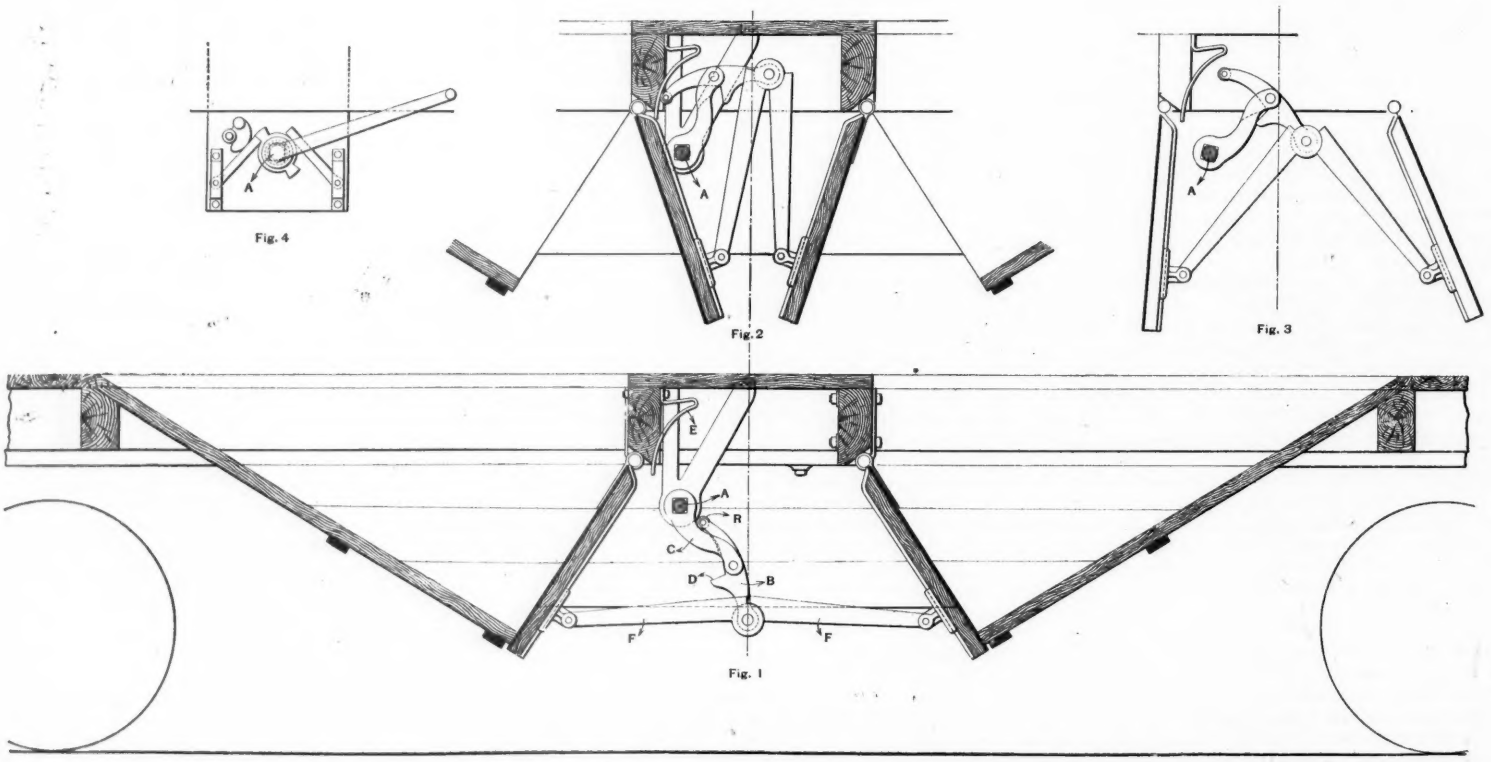
The aggregate length of sidings on the road when the operating company took possession was 50.48 miles, and June 30, 1894, the length was 124.89 miles, showing 74.41 miles to have been built by the company. In a report made by Mr. Bouscaren to the General Manager of the Cincinnati Railroad Company November, 1880, he estimated that only 25 miles of siding would be required to complete a total of 65 miles and answer the needs of the property. The discrepancy is explained by the fact that the engineer's estimate was based on gross receipts of $10,000 a mile. In fact, the earnings of the road reached $13,000 a mile in 1890 and 1891, and the average earning per ton of freight has fallen from $2.44 in 1882 to $1.41 in 1894, which means that so much more freight must be carried now to earn the same amount of revenue. Under these altered conditions the 65 miles of siding estimated upon in the former report would be equivalent to 146 miles now, or 21 miles more than have been provided.



Brake Rigging—King Hopper Gondola Car.



Plan of Car and Hopper—King Hopper Gondola Car.



Operation of Hopper Mechanism—King Hopper Gondola Car.

and replaced with heavier steel rails. There is over 73 miles of 75-lb. steel and 262 miles of 60-lb. steel. There is also 0.81 mile of 85-lb. steel. In all 324 miles has been relaid in heavier steel by the lessees. The rails in the main track are generally in good condition, showing good steel, except that some of the new 75-lb. rails are unduly hard and laminated. They are part of an inferior lot,

Switches and Signals.—Point switches or Wharton switches are used for all turnouts from main track, and have been connected to elevated targets.

Automatic block signals for 63 miles, with an equipment of 97 signals, have been put in to protect the principal tunnels and bridges, and interlocked signals have been put in at seven crossings and one drawbridge.

Semaphore signals have been put up at all telegraph stations, and at a large proportion of these distant signals are connected with the home signals.

Cross Ties.—The number of ties replaced each year, from October, 1881, to June 30, 1894, is given in the report, the yearly replacement varying from about 85,000 up to 267,000. In 12 years and 8 months the total ties put in were 1,950,919. The average length of track maintained was 420 miles, including sidings. The average number of ties renewed per year per mile was therefore 365, and the average length of service of ties 7.24 years, which is considered a fair showing considering the conditions of climate and traffic. The track maintained during 1893 and 1894, not including sidings laid that year, amounted to 456.5 miles, and the number of ties replaced per mile of track was 295, leaving a discrepancy of 70 per mile below the average, which is explained by the fact that this work was interrupted by the great railroad strike.

Ballast.—Yearly reports of the quantity of ballast used are given, the total for 12 years 8½ months having been 670,339 cu. yds., or an average of 52,782 cu. yds. a year on 330 miles of track, exclusive of bridges. Nearly 10,000 cu. yds. was used in 1893 and 1894 above the yearly average; but there is considerable work of this sort required to bring the track up to the proper standard. On 186 miles the ballasting is all that could be desired, but on 150 miles it is more or less scant. Gravel is used on 75 miles, furnace slag on 86, broken stone on 175.

Fencing.—A considerable amount of substantial wire fencing has been built by the lessees. The fencing built by land owners is generally inferior. In many places the fencing originally built by the trustees is in bad repair, and often this was not built on the boundary lines and adjacent land owners have had permission to cultivate part of the right of way. This condition of affairs is likely to lead to confusion, and the fences should be put on the boundary lines wherever possible. Much additional fencing is required for the protection of trains.

Bridges.—Before the lease the bridges consisted of:

Iron bridges and viaducts	26,144 lin. ft.
Wooden bridges	1,26 "
Wooden trestles	11,535 "

The bridges now are, iron bridges and viaducts 29,127 lin. ft., wooden trestles 4,016 ft. All the wooden bridges have been replaced with iron or steel and about three-fifths of the trestles have been filled or replaced with iron and masonry structures; 1,263 ft. of iron bridges and viaducts, and over half a million cubic yards of embankment have been put in place of wooden structures, besides four masonry arches. Repairs to the masonry of old structures have been made in many places, but further repairs are needed. In many instances where a slight additional elevation was required for the pedestals of viaducts, wooden blocks have been put in between the cap stones and the shoes. These should be replaced with iron plates.

Nearly one half the iron structures need painting. The others are in good condition in this respect. It is noticeable that where red lead has been used it has generally afforded a better and more durable protection of the iron than the so-called iron paint. The wooden trestles not yet replaced and the decks of iron bridges and viaducts are in an average fair condition of maintenance. Inside guard rails have been provided on all bridges.

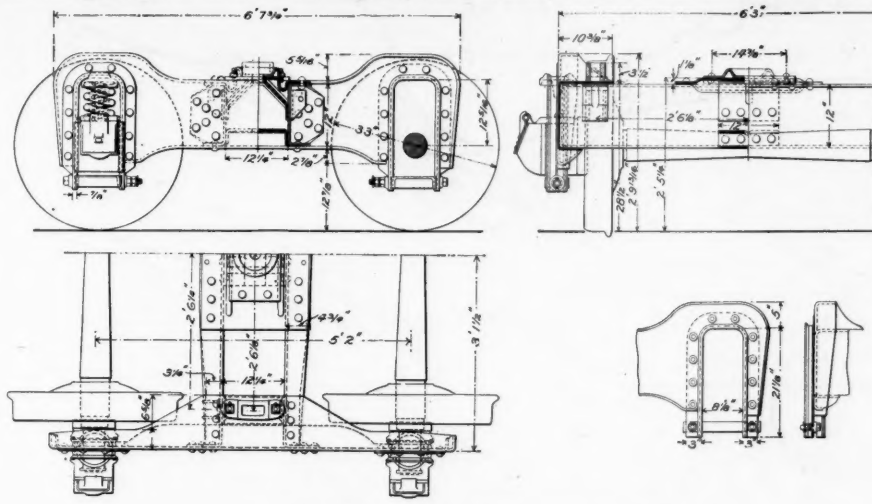
There were originally 23 overhead bridges for public road crossings between Cincinnati and High bridge; two more have been built by the lessees. Nine of the old structures have been rebuilt in iron and 10 replaced with iron supports and wooden decks.

We gather from the report that the equipment in the way of stations, shops and other buildings is only fairly complete, but the buildings are in pretty good condition.

Betterments.—The betterments made by the lessees must, under the conditions of their contract, revert to the city at the termination of the lease. The cost, as charged by the auditor on the books of the company, amounts to $2,204,477. Of this $1,556,807 is charged to track and roadbed, the biggest single item being over $636,000 for tunnel arching. The next item in size is $575,000 for new sidings; then we have $109,000 for renewals of rails, $98,000 for ballasting, $71,000 for signaling and $25,000 for change of gage. In the rail renewal item the sum of $175,000, paid for replacing light steel and iron with heavier steel after 1887, has not been charged in. The charge for bridges is over $259,000 and for buildings over $284,000. Mr. Bouscaren's approximate estimate of the cost of completing the Cincinnati Southern under contract with the city, as made in November, 1880, was $2,786,462. The cost of replacing iron and light steel rails was not included in this. Deducting this item from the lessees' account of cost of betterments, the balance of the 1880 estimate over actual expenditure is more than $691,000. To comply with the specifications of the lease, there yet remains 5,317 lin. ft. of tunnel to be arched, 4,017 ft. of wooden trestles to be replaced, block system and fencing to be completed and additional sidings and buildings to be constructed. The cost of these improvements will probably exceed the engineer's estimate, owing to the enlarged equipment required to handle a traffic greater than was expected.

Rolling Stock and Machinery.—The locomotive equipment has been increased by the lessees 89 per cent., passenger equipment 74 per cent., freight equipment 161 per cent.; this without making allowance for the increased weight and power of the locomotives or greater capacity of cars. The company paid to the Cincinnati Railroad Company and the Trustees, for equipment, $1,865,774. The cost of additional equipment has been $1,161,539. This property stands as security for the faithful performance of the conditions of the lease. The city's interests are better protected now than they were at the beginning.

For 12 years and 8½ months the gross receipts have been 43¾ millions, the operating expenses 30 millions, the net receipts 13⅝ millions. The leasing company has paid, cash rentals $11,370,000, cost of betterments $2,204,000, leaving a balance of net receipts of only $119,412. Practically the entire net earnings of the company have been paid to the city in rentals and betterments. That the property should be found in good condition under circumstances so onerous, is a fact very creditable to the company and very fortunate for the city.

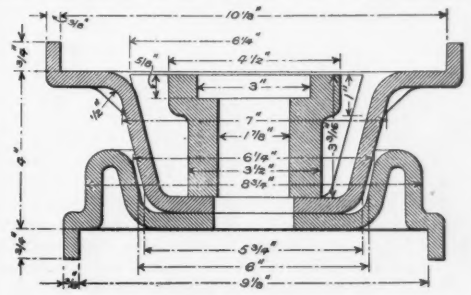


Details of Fox Truck—King Hopper Gondola Car

The King Hopper Gondola Car—Lehigh Valley Railroad.

We illustrate herewith a 60,000-lb. hopper bottom gondola coal car built by the Buffalo Car Manufacturing Co., which was shown by a half-tone reproduction from a photograph in the *Railroad Gazette* for June 7, 1895. As we have said, the capacity of the car is 60,000 lbs. Its weight is 28,000 lbs. The length over end sills is 31 ft. and the length inside end planking is 28 ft. 6½ in. The width over side sills is 8 ft. 11 in., and the height from top of sills to top of planking is 4 ft. ¾ in. The truck wheel base is 5 ft. 2 in.; size of hopper openings 50 sq. ft. The side and end planking of the car, and the outside, center and intermediate sills are all of yellow pine, while the end sills, draft timbers, stakes, flooring, doors and chute planking are of white oak. The flooring is tongued and grooved and laid in planks having a face measure of 4 in.

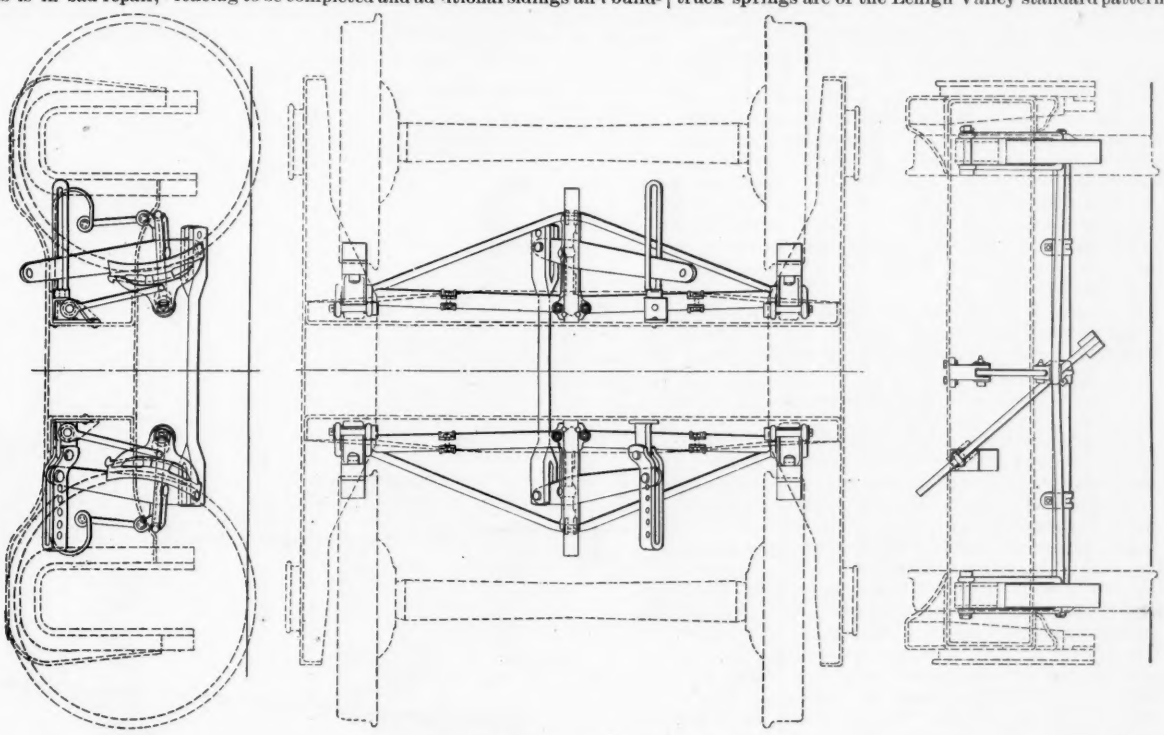
As is shown by the detailed drawings, the car is equipped with the air-brake, the Westinghouse quick action being used. Each truck is equipped with the brake, and the break beams, of the National Hollow Brake Beam make, are hung between the wheels. These



Center Plates—Fox Steel Truck.

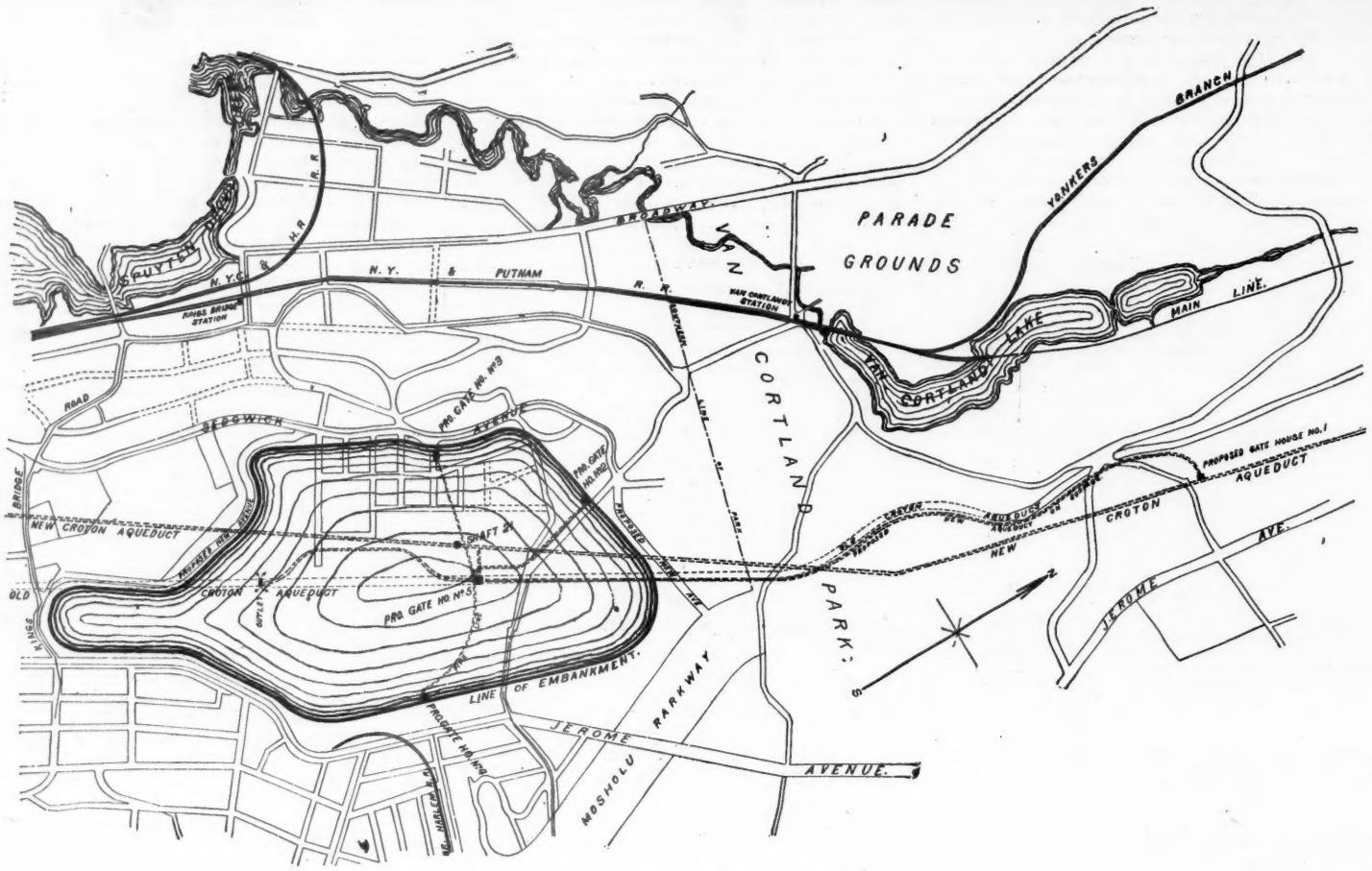
beams are fitted with the Christie head and shoe. Hand brake staffs are provided at each end of the car.

The truss rods for the car body are 1¼ in. in diameter, upset to 1⅝ in. diameter, and fitted with the Cleveland City Forge & Iron Co.'s turnbuckles. The draft and truck springs are of the Lehigh Valley standard pattern and the trucks are of the Fox type. The Gould M. C. B. yoke coupler is used with these cars, and also the Schoen drawbar with side lugs.



Brake Rigging—King Hopper Gondola Car.

The wheels used weigh from 590 to 600 lbs., and are 33 in. in diameter, of chilled cast iron. They must be capable of withstanding a pressure of 45 tons in forcing on the axle. In testing, these wheels are placed flange downward on a 1,700 lb. anvil block, having three supports not more than 5 in. wide for the wheel to rest on. A flat bottomed weight of 140 lbs. falling freely 12 ft. must strike the wheel a minimum number of nine blows without breaking it. The axles are open-hearth steel, and in making them not less than 25 per cent. in weight is to be



Map Showing Location of Jerome Park Reservoir

discarded from the top end of each ingot. The journals are 4½ in. × 8 in. of the M. C. B. standard. Journal boxes, bearings and wedges are of the Lehigh Valley standard with Morris pressed steel lids. The center plates shown in the accompanying engravings are of pressed steel and the side bearings are of the Lehigh Valley standard.

The double refined iron used in these cars has a tensile strength of not less than 50,000 lbs. per square inch and 25 per cent. elongation on a 4 in. piece. The fracture must be uniformly fibrous, the metal being free from longtitudinal seams and able to stand bending double and hammering down without flaw when cold. The specifications for merchant bar iron are similar, except that an elongation of 20 per cent. is specified.

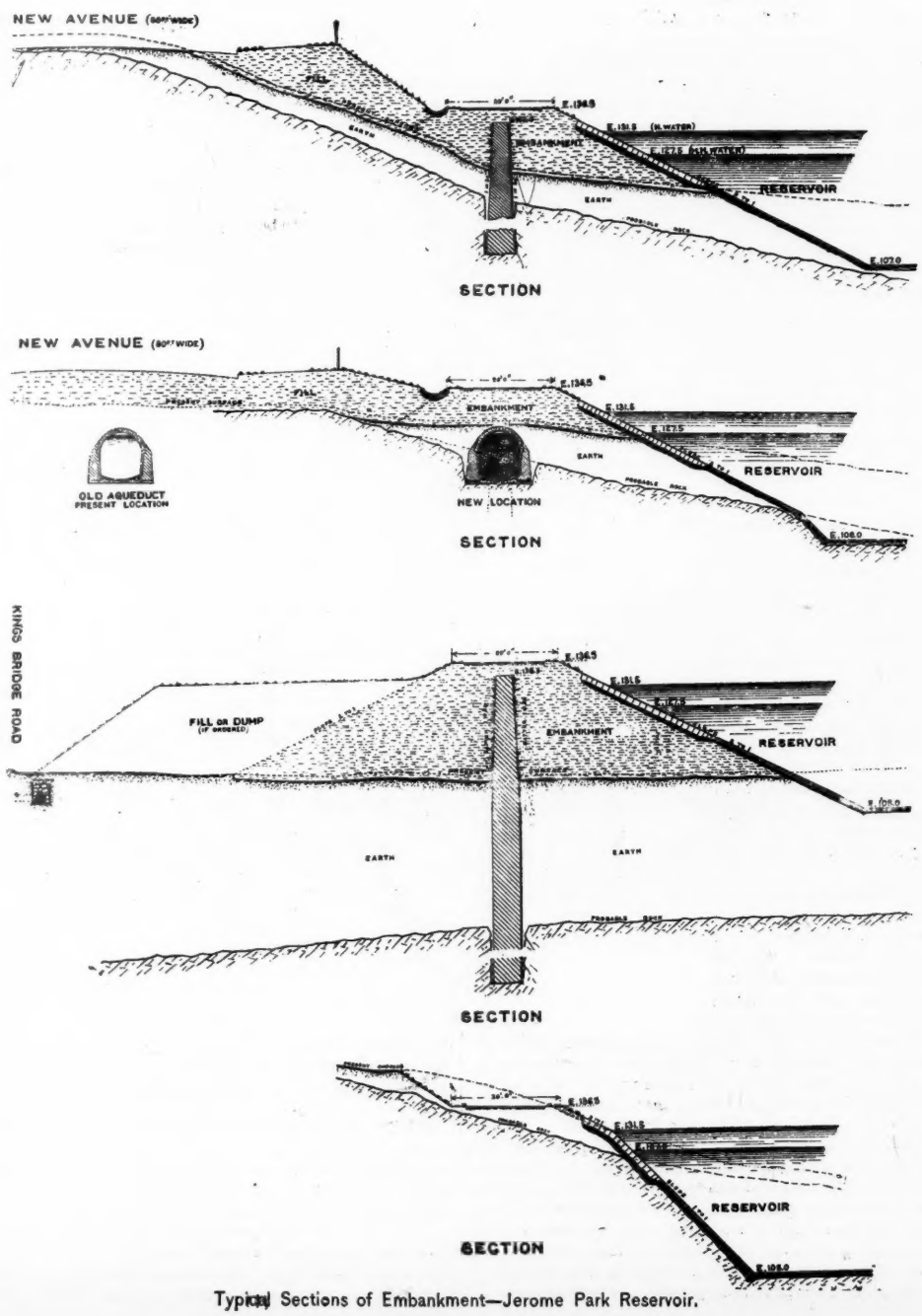
The operation of the mechanism of the hopper doors is shown in the illustrations, Figs. 1, 2, 3 and 4. Fig. 1 shows the doors closed by means of the toggle joint *F*. To open the doors a crank is fitted to the crank shaft *A*. By turning this the piece *B* is raised, opening the toggle joint as shown in Fig. 3. After the crank has been turned sufficiently, the roller *R* at the extremity of *B* strikes against the guide *E* and is forced downward; *R* then acts as a fulcrum, the power being applied to the lever near its center point. The doors then take the open position shown in Fig. 2. Fig. 4 shows the locking device in detail.

These cars have been very successful upon the Lehigh Valley in handling material quickly, and in freedom from repairs and satisfactory operation of parts.

The Jerome Park Reservoir.

To provide additional and adequate distributing reservoirs for the city of New York has, for a number of years, been one of the chief problems confronting the Aqueduct Commissioners. That section of the city north of the Harlem River has for some time been in need of a distributing reservoir, a fact which becomes yearly more apparent. The Central Park reservoir, as we said last week, has a capacity of 1,000,000,000 gallons, which, since the present daily consumption of the city is nearly 190,000,000 gallons, is sufficient for only five day's supply. The 1,500,000,000 gallons to be contained by the new reservoir will increase the available supply to 10 days. Of this, about one-half should be counted on, since to depress the levels of the reservoirs below this point, would reduce the pressure more than is desirable.

As long ago as 1884 the construction of this reservoir was decided on, and in view of this fact the size of the new Croton Aqueduct was diminished below shaft 20. The map, Fig. 1, of the proposed reservoir and surrounding country shows the line of the new Croton Aqueduct, which is tapped at gate-house No. 1 by the proposed aqueduct, the latter feeding the new reservoir. On the site of the reservoir the new aqueduct is under pressure at a depth averaging 115 ft. below the surrounding ground and is in communication with the surface by means of the open shaft 21. The proposed aqueduct will be somewhat over a mile in length, and will be of a horse shoe shape, 13.5 ft. high and 11.4 ft. wide. It follows the line of the old aqueduct closely, and both structures continue side by side in a general north and south direction,



Typical Sections of Embankment—Jerome Park Reservoir.

through the reservoir to a point near its southern boundary where the water, being emptied, must circulate freely back to shaft 21. In passing through the reservoir the structure containing the two aqueducts forms a division wall, dividing the reservoir into two distinct sections, either of which can be used independently of the other.

The work will include the building of several small gate-houses and one main gate-house. The latter is designed to allow the old aqueduct to carry water directly to the city, or to the reservoir only, to establish a connection between the two aqueducts, to empty into either section of the reservoir the contents of the new aqueduct or put the latter in direct connection with the city; to empty the water, which has circulated through the reservoir, through shaft 21 into the new aqueduct, and to enable the supply to be kept up, whether one section or both of the reservoir are empty, by means of pipes directly connected with three outlet gate-houses, placed on Sedgwick avenue at the head of the valley, at the northwest corner of the reservoir, and on Jerome avenue, respectively. Nearly all the water supply of the city will be made to circulate through the reservoir before passing to the various parts of the city, in order that the water may be purified by subsidence.

The embankments of the reservoir are to be of earth with a masonry core wall, at all points where the ground is not naturally high enough. The maximum height of these walls will be 36 ft., this being at the head of the valley at the northwest corner of the reservoir. At other points the height of the embankment will be small.

The borings which have been made on the site of the new reservoir indicate a considerable quantity of water-bearing sand underlying the soil and earth. The intervening layer of earth will be used for the embankments, the slopes of which, together with the bottom of the reservoir, will be lined with an impervious covering composed mainly of concrete, and brick and stone paving. Such of the excavated material as is not used for building embankments, etc., will be disposed of by the contractor in such ways as he may select, and this will be a very costly part of his work. The slopes which are to be covered with concrete and paving must be excavated to within a normal distance of 6 in. of the final surface. The remaining earth will be removed just before laying the concrete, to secure a true and even surface.

The excavating for the reservoir includes 3,730,000 cu. yds. of earth excavation and 3,165,000 cu. yds. of rock excavation. This rock excavation when along the line of the aqueduct or close to the bottom or slope of the reservoir, will be done with explosives of moderate power, to avoid damaging effects, and thus leave the rock surface, especially when it is to be used for masonry foundations, firm and solid. Under the embankments it will be roughly stepped. Before laying concrete on the bottom or slopes all projections must be removed, and the depressions solidly tamped with small broken stone, to present a smooth and even surface.

In building the reservoir and aqueduct, all embankments and filling will be carried up in horizontal layers of a maximum thickness of 6 in., each layer being watered and rolled or rammed solid before the next is placed upon it. The earth used must be free from stones exceeding 3 in. in diameter, or perishable material. During their construction, they will be kept about 5 ft. below the masonry of the enclosed core wall. We show in Fig. 3, typical sections of the reservoir embankments, showing the water levels, fills, core walls, etc., and their relation to the present surface of the ground. The embankments will be sodded when completed.

In the masonry work, American and Portland cements will be used and all masonry, except where otherwise specified, will be laid in hydraulic cement mortar. If laid during freezing or hot weather, it must be carefully protected while setting. The extrados of the arch of the aqueducts in both parts of the work, and of the arches in the gate-houses, are to be covered with a coating of cement mortar ¾ in. thick of American cement and sand.

For the gate-houses, the aqueduct side walls, and the core walls of the embankments, rubble masonry will be used, and where a facing is desirable, broken ashlar will be put in, not less than 20 in. deep from the face, with joints cut to a depth of 6 in.

The excavation for the aqueduct includes 85,000 cu. yds. of earth excavation, and 23,000 cu. yds. of rock excavation. The concrete used in the entire work will be about 151,000 cu. yds. There will be 30,000 ft. of permanent timber work, 35,000 cu. yds. of brick masonry, 113,000 cu. yds. of rubble, 17,000 cu. yds. of dry rubble, 250,000 sq. ft. of rubble facing work, and a large amount of granite dimension stone, fine hammered facing, and other grades of masonry. In addition there will be large quantities of piping, special castings, iron and steel work of different sorts, etc.

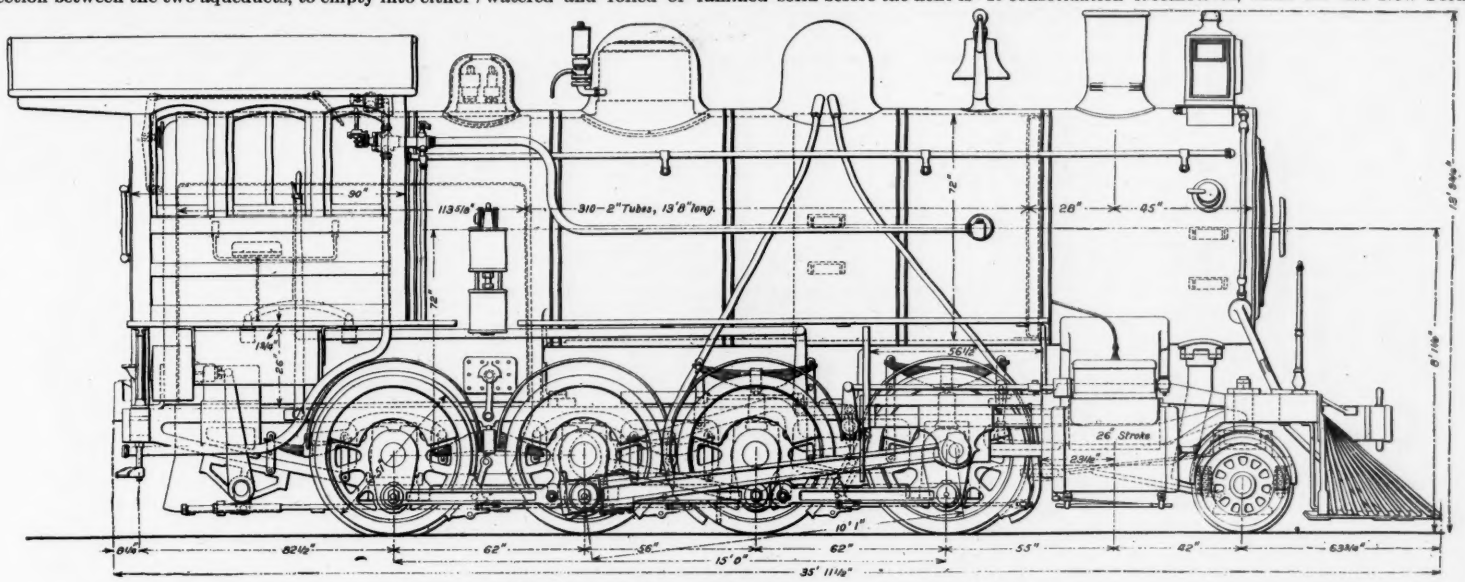
All timber for grillages, sheet piling, etc., will be of spruce, sound and straight grained.

After the contract is awarded, the Aqueduct Commissioners will sell at auction, for the benefit of the city, the buildings at present on the site of the reservoir, and they are to be removed unless they become the property of the contractor. The Oak Ridge club-house, and surrounding grounds, will, however, be reserved for the use of the city until such time as the Aqueduct Commissioners may decide otherwise.

Of the 18 bids received July 10, the lowest was $5,300,000, and the engineer's estimate was $5,882,690.

Consolidation Locomotive, N. Y., N. H. & H. R. R.

We published in the *Railroad Gazette* for April 26, 1895, a photograph and specifications of one of a lot of 10 consolidation locomotives, built for the New York, New Haven & Hartford by the Rhode Island Locomotive Works, after designs by Mr. John Henney, Jr., Superintendent of Motive Power of that road. The engines have given especially satisfactory results since they were put into service.



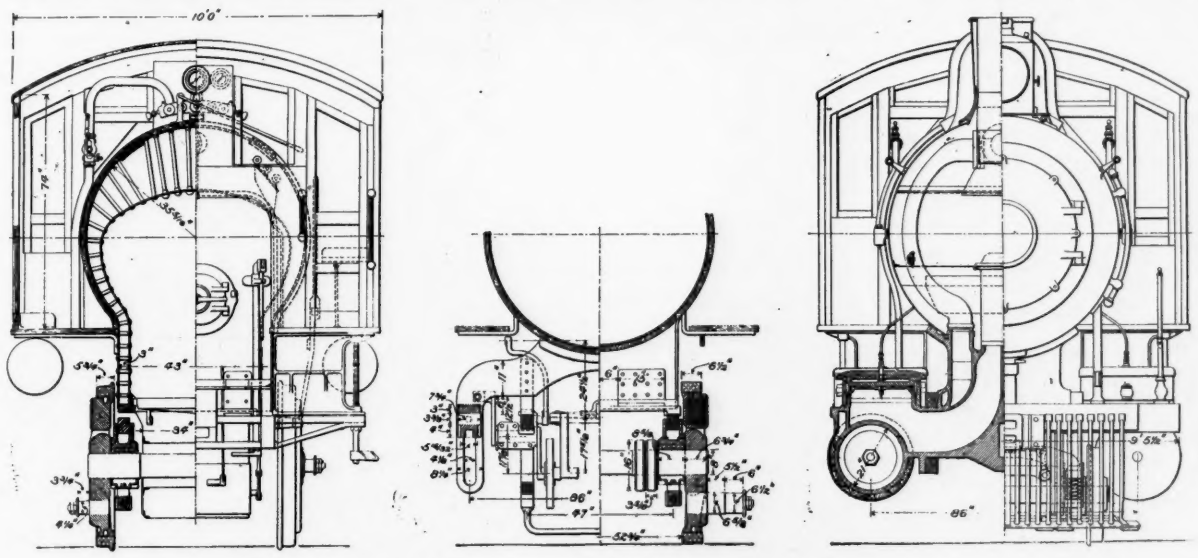
Heavy Consolidation Locomotive, New York, New Haven & Hartford Railroad.

The elevation and sections, given herewith, show the details of construction clearly. The stack is straight and a double exhaust nozzle is used. The boiler has a diameter of 72 in., the crown sheet being stayed with radial stays, as shown. Blind tires are used on four of the eight drivers, the first and third on each side only being flanged. The driving wheel base is 15 ft. and the driving wheels are 51 in. in diameter, with cast iron centers, and 3½ in. Midvale steel tires.

Further details will be found in the specifications previously published.

International Congress Report on Signals.

Question XI. before the International Railway Congress at London this year was on the subject of signals, and the report upon it for English speaking countries is by Mr. A. M. Thompson, Signal Engineer of the London & North Western, one of the inventors of the Webb & Thompson train staff. The report, with appendices, fills over 50 pages. It tells little that is new, but is valuable as a full summary of present practice, by a careful man, based on intelligent questions, to which he has secured answers from Great Britain, Ireland, India, Australia, Africa and the United States. From India, Australia and Africa the answers are quite satisfactory, the railroads being operated by the governments, and the practice being modeled more closely after English practice than is the case in this country. But from Canada no answers were received, and from this country only six companies replied. These six are not very prominent in signaling, and Mr. Thompson's American information is therefore based chiefly on the minutes of recent meetings of the American Railway Association. Even the reports to that Association were incomplete and unsatisfactory, so that it is not surprising to find Mr. Thompson's American conclusions frequently lacking in definiteness.



Sectional Views, New York, New Haven & Hartford Heavy Consolidation Locomotive.

Practically all the passenger railroads of Great Britain and Ireland are fully interlocked, and worked on the absolute block system. The machinery employed varies greatly in constructive detail, but the systems are identical, and the replies from three principal companies, the London & North Western; the Great Western and the Midland, which are given in full, fairly represent the whole country. In addition to this full statement of replies, there is a resumé of the regulations of the Board of Trade for the construction and operation

of signals, so that English practice is very well set forth. The colonies, like the thinly settled parts of this country, have very little signal apparatus. New South Wales has made the most progress. That country has 2,500 miles of road, of which 1,344 miles is worked by the staff system and 999 miles by electric staff or tablet. The remaining 157 miles is double track, operated by the block system. Sixty per cent. of the stations are interlocked.

The questions sent out by Mr. Thompson numbered 75, and the body of his report consists of an epitome of the answers, in the order of the numbers. We give the most salient points.

The mileage of railroad is: Great Britain, 20,500; India, 18,000; South Africa, 2,653; Australia, 12,000; Canada, 14,000; United States, 176,000. The semaphore is universal, except in the United States, for main line signals. Discs are used in England and the colonies for sidings and reverse movement signals. The size of semaphore recommended in the American Railway Association report is about the same as the standard English practice.

Signal Light Colors.—Red for danger is universal; green for all right is the rule both in Great Britain and the colonies, and the white lights still in use are likely to be soon abandoned. There is no caution signal in use except in the United States. (The term "caution" is not used for distant signals.) Speaking of the movement in this country for a more distinctive night distant signal, Mr. Thompson says that the necessity for such distinctness has not been greatly felt in Great Britain, "but any simple means of distinction which would not necessitate an entire reconstruction of the signals, or any extra lighting, would probably be welcome." For siding signals, for all-right, both green and white are used.

Placing the signal arm on the left of the post and the post at the left of the track is universal except in this country.

The purple light is largely used in the United States. Great Britain and Ireland as a danger light for siding or other subordinate signals. It is also used as a back light, and by some companies as an all-right signal for switching. It is very imperfect beyond 600 ft. Distant signals are universal everywhere except in this country. Only here are distant signal arms painted green or any color other than red.

Distant signals are placed from 300 to 1,700 yds. from the home signal. In a few cases in England they are worked successfully over a mile. As a rule it is not desirable to greatly exceed 3,600 ft. Where there are several signal arms on the same post, the top arm applies to the line at the left, in Great Britain and Ireland, but in the colonies the practice is the same as the best practice in this country; that is, the top arm is for the line of greatest importance.

Where there is a separate main line for freight trains, the semaphore signals for such a line have a ring on the arm, and the post is not generally so high as the passenger line post. Mr. Thompson says that this ring, or an equivalent device, prevails in the United States, which we think is incorrect. A green light is still used for back lights in England, but purple is likely to supersede it soon. As a rule, electric repeaters are used for signals out of sight of the operator.

The 30 English companies that replied have 107,672 signals, the London & North Western leading with 14,000. The New South Wales lines have 2,540 signals. All signals in England and the colonies are mechanical, operated manually, except on the Liverpool Overhead and one or two others.

Interlocking.—Tappet locking is the prevailing type. Many of the large English companies make their own interlocking frames and details differ. The London & North Western has 34,000 levers, of which 25,000 are in machines of the Webb pattern.

That road uses a cheap key interlocking frame at small stations which is generally placed in or near the ticket office. The report gives a drawing of this frame. This frame is also in use in New South Wales.

In discussing power systems for interlocking Mr. Thompson says that they are generally unnecessary, because one man can work 80 levers without difficulty; at the Euston station of the London & North Western 240 levers are worked by two men. The author goes on to argue against expensive power installations, though he admits that placing the connections underground would be an important advantage at a crowded junction.

The 30 English companies have 12,151 signal cabins containing 203,545 levers. The New South Wales roads have 108 cabins and 3,500 levers. In Great Britain trailing point switches are worked as far as 900 ft. from the cabin. Facing point locks are universal on passenger lines in Great Britain and are used to some extent on freight lines. Detector bars are from 20 to 35 ft. long, generally constructed of a light section of T or L iron. Detector bars to indicate the presence of a car on a track, as in a terminal station, are common in Great Britain and Ireland, but not elsewhere. Derailing switches are universal in Great Britain for the ends of sidings. These are also generally used where a main freight track joins a passenger line. Derailing switches on steep grades are general in Great Britain, being required by the Board of Trade.

Automatic fog signals have not been adopted and the author seems to regard them as unreliable. The London & North Western has, however, about 240 Woodhead machines for placing ordinary torpedoes on the rails. This machine seems designed to enable one attendant to manage torpedoes at two or more signals without crossing the tracks or otherwise endangering himself. On 4-track lines it has been possible to dispense with the services of half the men, thus saving some wages. In one instance, near London, one of these machines, operated for five days, used only 14 torpedoes and the attendant crossed the tracks only four times, instead of 1,064 times, as would have been necessary under the old system.

The London & North Western has 19,000 miles of telegraph wires and 117,000 cells of battery. Lock and block instruments, the Sykes system or something on that principle, are used by eight companies in England. The report states that in this country they are used to a very small extent, which is somewhat misleading in view of the extensive use of these instruments on the New York Central, the Erie and the New York, New Haven & Hartford. The general feeling among Englishmen appears to be that this system is not satisfactory where there is a large freight traffic.

Single track railroads in Great Britain are worked in various ways, but in no case is a permissive or time system worked. The electric staff will probably soon be universal in that country. The principle of this apparatus is briefly stated as follows:

"The principle upon which the automatic working is based is that of a normally closed circuit in which the line batteries oppose each other and preserve a static balance when all staffs are in, and are in series with each other when a staff is out. To prevent the batteries unduly running down under the latter condition, an 'economizer' consisting of a very high resistance and automatic switch is used. This reduces the current to a milliampere whenever the potential exceeds that of one main battery and enables Leclanche or dry cells to be used, but if a good copper sulphate or bichromate cell is adopted the 'economizer' may be dispensed with."

Mr. Thompson refers to this apparatus in very modest terms, presumably because one of the most prominent machines in use is his own invention, but he gives particulars of its use in New South Wales and commends it to the notice of American and colonial railroads. The modified Webb & Thompson machine for allowing two or more trains to follow one another in the same section, which is used on the Chicago, Milwaukee & St. Paul, is referred to as "not yet sufficiently tested to justify more than a passing notice."

Color Blindness.—Holmgren's wool test and dot card appears to be the general practice. Question 67 asked if color blindness was ever the primary cause of an accident, and no case is reported.

Question 69 asks if long sidings or other special devices for preventing collisions at junctions have been adopted; nothing of the kind is reported except the usual derailer in this country. In England only one train is allowed to approach a junction at the same time, all others being held one block section back. A few English companies are experimenting with devices for reminding a signalman, should he forget, that a train is standing on the main line. The most common device is a tablet to be placed on the lever.

Asked if there is in use any appliance which is specially useful, but not generally known, certain companies answer as follows:

North London.—Train protection bar and automatic back locking.

London & South Western.—Route locking.

Great Northern.—Centered semaphore signal arm.

South Eastern.—Automatic locking in connection with turntables.

Cheshire Lines.—Automatic check locking.

Metropolitan District Railway.—An automatic mechanical appliance for restoring signals to danger by a passing train.

Great Western and London & North Western.—When the distant signal for a cabin in advance is placed on the starting signal, and also on the signal for a cabin in the rear, the distant arm on the home signal is controlled by the starting signal for the rear cabin.

Government Railways of New South Wales.—Duplex and Bracket lock system. This is an arrangement by which the rod connection, usually employed for working the points for sidings connecting with single lines, is saved. The point on the single line is provided with a staff lock and the safety point on the siding is provided with a Duplex lock. The staff lock is used to unlock the upper portion of the Duplex lock. This releases the lower key, which unlocks the catch points (derailer), and is also taken out to unlock the lock at the facing points. All switches are thus freed, and may be worked by ordinary ground levers, and the cost of rod connections saved.

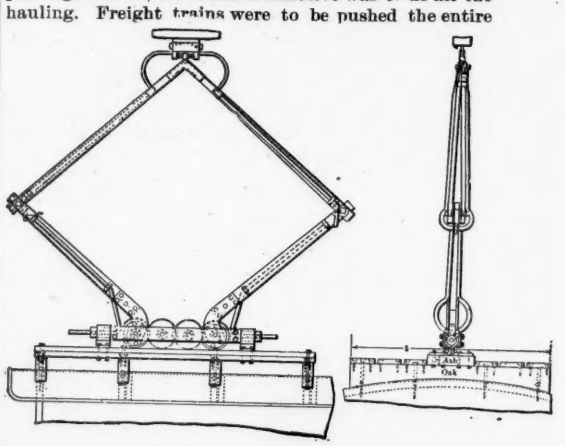
Appendix D describes this Duplex lock, used in New South Wales for isolated sidings. The usual English practice is to have a throw-off switch connected by rods with the main switch, so that both have to be turned together. The Duplex lock is used to avoid the necessity of the rod connection. Drawings of these locks are shown.

Electrical Equipment of the Baltimore Belt Line Tunnel.

It has been almost five years since the Baltimore & Ohio Railroad secured legislative permission to construct a tunnel under the city of Baltimore from Camden station north, in order to give the railroad a clear route through the city. To construct the road the Belt Line Co. was formed, and in September, 1890, the Maryland Construction Co., which did the construction work, began the actual work of driving a tunnel. The length of the tunnel is 7,339 ft. After lining, it is 27 ft. wide × 22 ft. high and cost $225 a lineal foot.

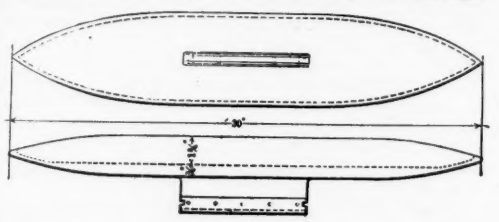
Although many persons seem to regard the use of the electric locomotive on this line as an encroachment of electricity upon the field of modern travel, the principal reason for its adoption was the question of ventilation of the tunnel. The electric locomotive promised a means of doing away with smoke, gases, etc., and of allowing the tunnel to be painted white throughout and electrically lighted without danger of its becoming smoke begrimed.

The plan of operation first considered was to have the electric locomotive put on the rear of trains going north at the portal of the tunnel near Camden station, and push them through the tunnel and open intervening spaces to Mt. Royal avenue. From here, in the case of passenger trains, the steam locomotive was to do all the hauling. Freight trains were to be pushed the entire



Side and End Views of Trolley.

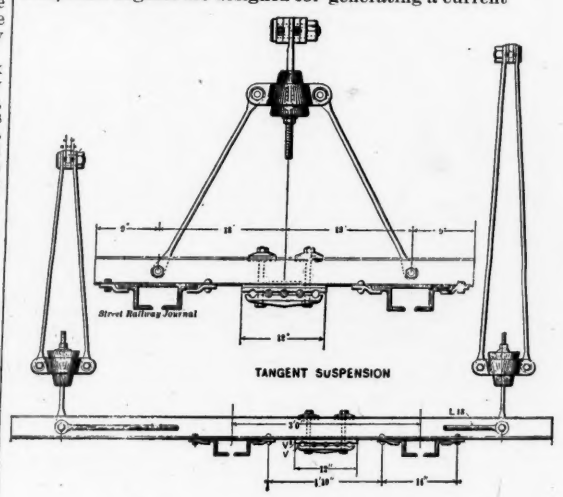
distance. The calculations provided a maximum weight of 500 tons for passenger trains, including the locomotive, and a speed of 35 miles an hour, and 1,200 tons for freight trains with a speed of 15 miles an hour. The grades are 0.8 per cent., and the number of trains each way was to be about 100 a day. This has been somewhat modified, the plan of pushing passenger trains having been abandoned, being judged unsafe. They will therefore be pulled through from the Lombard street station near the south end of the tunnel to the Bolton street station at the north end. Freight trains will be pushed through



Shoe for Trolley.

to Huntington avenue, the steam locomotive helping the electric one on the heavier grade just beyond the north end of the tunnel.

The power house, which we described in the *Railroad Gazette* for July 5, 1895, stands on the west side of Howard street about 1,800 feet south of the tunnel portal. It is a fireproof building containing a boiler and engine room, fitted up with the latest and most improved devices, such as the "Lux" drip system, 48-in. separators for the mains, angle check and stop valves, Pearson expansion joints for the steam pipes, etc. The Allis-Corliss compound engines are designed for generating a current



Method of Suspending the Conductors.

of 700 volts, the generators being 500-K. W. General Electric, running at 110 revolutions per minute. There are also smaller generators for the incandescent and arc-lighting systems.

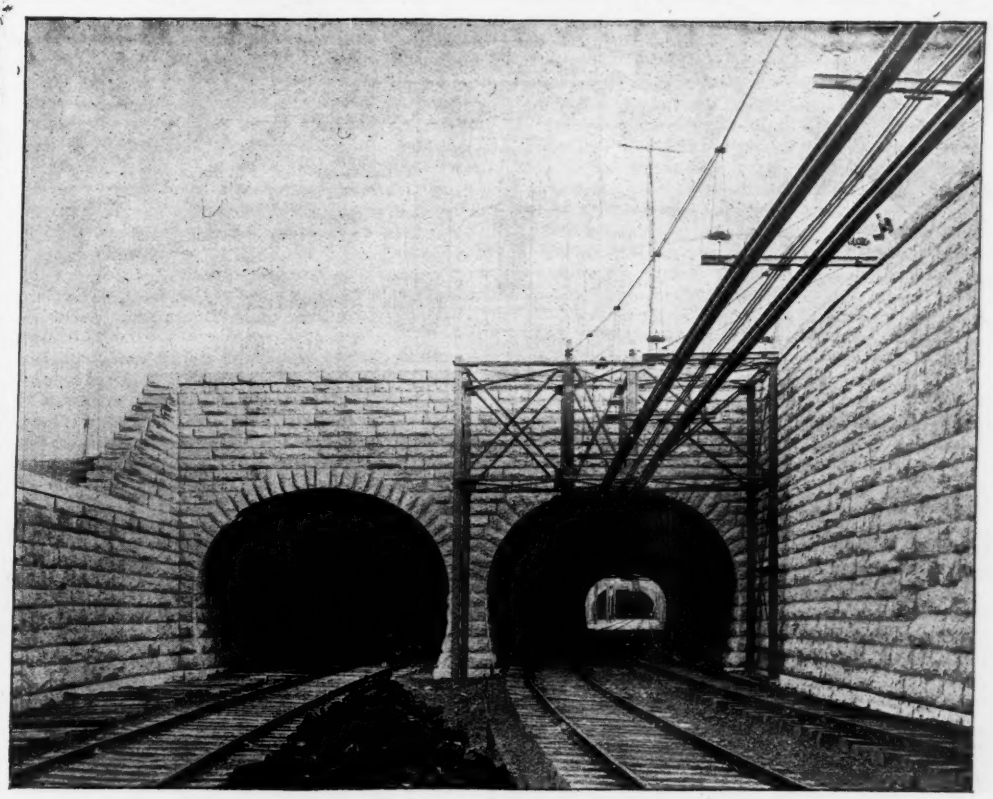
Eight cables of stranded copper, each of 500,000 C. M. cross-section, pass to the overhead structure immediately outside the power house, where connection is made to the three feeder cables of 1,000,000 C. M. cross-section each and to the overhead conductor. The rails are bonded with No. 0000 wire and are connected to the return cables laid in a wooden box between the tracks. The hollow expanded rivet used in the bonds provides a perfect contact.

The distance over which the electric locomotives will operate is about 15,000 ft. altogether, comprising two sections of tunnel 7,339 ft. and 265 ft. respectively, and 7,396 ft. of open track. Three tracks are laid into the southern portal of the tunnel. Two pass through it and four are laid from the northern portal through the Mt. Royal avenue arch, and from here two tracks as far as Huntington avenue, where a siding is provided for the electric locomotives. The grade throughout the tunnel is 0.8 per cent. going north, and the open track has two equated curves of 10 deg. and a steady gradient of 1⅛ per cent.

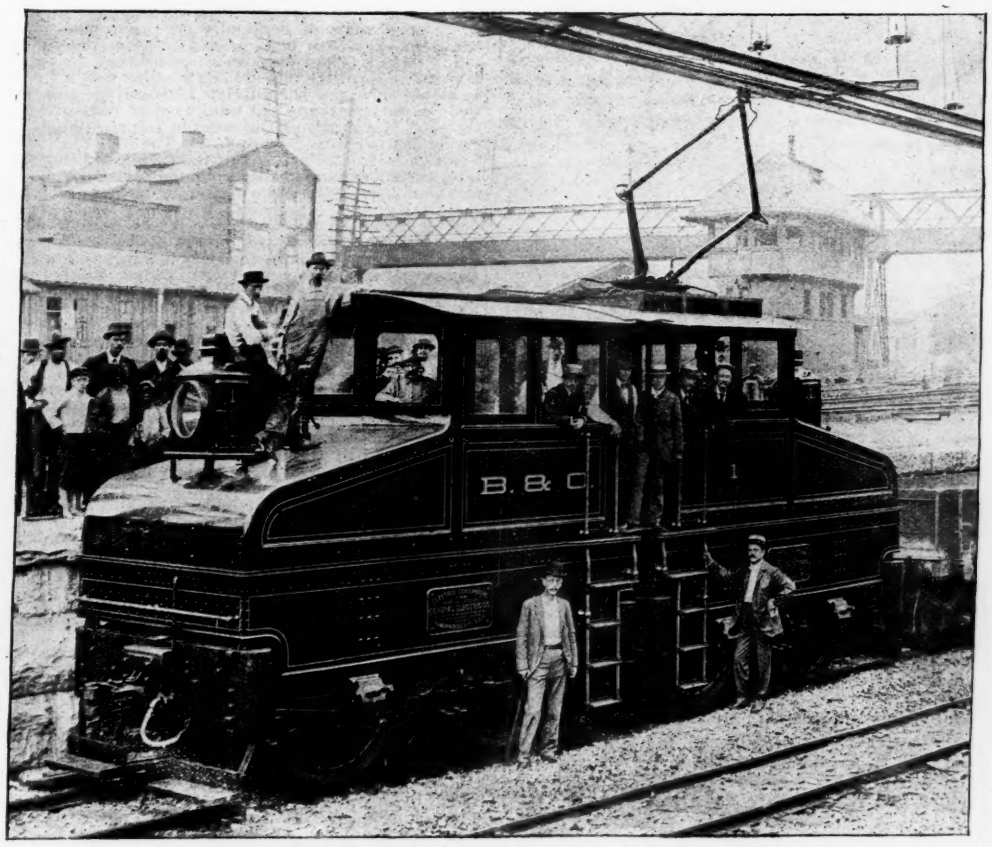
The overhead conductor is an iron trough composed of two 3-in. × ⅜-in. Z bars riveted to a ¼-in. cover plate 11⅛ in. wide. It is in 30-ft. lengths weighing 30 lbs. per foot, and is carried on trusses in the open and on the other parts of the line, attached to the roof of the tunnel. Throughout the tunnel it is over the center of the space between the tracks; outside, it is over the center line of each track. Inside the tunnel transverse frames are suspended from two bolts let into the masonry of the roof. These frames consist of two 3-in. channels joined by 4-in plates and holding four castings into which are fitted conical porcelain insulators, as shown in the accompanying engraving. The suspending bolts pass through the two outer insulators. A second pair of bolts passing through the two inner insulators suspend an iron stirrup supporting the conductor. (See engraving.) This method of double insulation effectively prevents leaking. The height of the conductors above the level of the top of the rails is 17 ft. 6 in. in the tunnel. Wooden shields, shown in the drawing, prevent brakemen on the tops of the cars from touching the conductors.

Outside the tunnel the conductors are supported 22 ft. above the rails by longitudinal catenaries, one for each line of track. These consist of chains of iron rods with 150 ft. span and are suspended from transverse trusses supported by latticed columns on either side of the double track. These are shown in the illustrations. The catenaries pass over the top of the transverse trusses and are fastened to a timber post, carried on the truss, which acts as an insulator. From points in the catenaries vertical rods every 15 ft. support the conductors, as shown in the engraving, their method of suspension being somewhat similar to that employed inside the tunnel. The second insulation is the timber post just mentioned and its top is covered with a hood to keep out moisture. The cross trusses vary in length from 30 to 62 ft., the latter length being used to span five tracks.

In the case of curves a double catenary is employed in order to secure the necessary points of suspension; thus for four tracks there would be four catenaries on curves and two on straight work.



The Overhead Construction in the Open Cut.



Pa'timore & Ohio Electric Locomotive.

The feeder cables are supported in iron cleats fastened between the overhead conductors.

The tunnel is lighted throughout by 32 C. P. incandescent lights, supported on the side walls of the tunnel every 15 ft. They are staggered so that a light occurs for each 7½ ft. throughout the tunnel. They are so supported as to be protected from moisture and dripping water from the tunnel walls and are 8 ft. from the ground. The lead-covered primaries for the lighting circuit are carried on posts set on the side of the cut southeast of the southern portal to where they enter the tunnel, and are carried on porcelain insulators throughout its length. At the points of support the cables are wrapped with wire to prevent abrasion.

We have described to some extent the 96-ton electric locomotives employed in the tunnel. Their dimensions were given in the *Railroad Gazette* for June 23, 1895. These locomotives are designed to run in either direction and are supported on two 4-wheel trucks. The front and back of the locomotive are provided with safety chains in addition to the Janney couplers used. The cab is of sheet steel with windows on all sides, so as to give an unobstructed view in all directions. It is supported on the frame by four half elliptical springs. The locomotive is fitted with sand boxes and Westinghouse automatic brakes for all wheels. These bear upon the flanges and outside tread only. A headlight is provided at each end, as well as compressed air whistle, automatic bell ringer, etc. The gearless motors, four in number, two to each truck, are flexibly supported and transmit their power to the driving axles by means of a driving-gear consisting of a cast steel spider shrunk and keyed to a cast steel driving sleeve. Each arm of the spider is provided with a double rubber cushion with a chilled cast-iron wearing cap, the cushion being forced into the arms of the spider and the cap. The journal bearings are outside the driving wheels and the driving boxes are of cast iron, with a phosphor bronze bearing fitted similarly to those of the steam locomotive. The box is closed at the bottom and has a well for oil and waste, a dust guard lid, etc., as in the case of improved passenger car boxes. The motors are supported on carriers bolted to the field magnets and rest in adjustable hangers carried on half elliptical springs placed on top of the frame and bumpers. The frames thus carry the motors by carriers and springs. The motors are designed to allow ready removal of the field frame for inspection and repairs.

The engravings show the method of supporting the brass shoe used for taking the current from the overhead conductor. As will be seen, the jointed frame which carries the shoe allows of motion horizontally and vertically, but not in the direction of the track. Trouble had been anticipated with the shoe, as it was thought that the surface of contact might be fused, causing it to stick in the slot. At a test of the locomotive on July 8, when it was pulling 24 loaded coal cars and a steam locomotive through the tunnel, the shoe became red hot and expanded to such an extent that it could not be moved. The train was taken from the tunnel in two setions by the steam locomotive. The heating was caused by imperfect contact with the overhead conductor caused by a deposit which had formed, due to moisture from the roof of the tunnel. This deposit has since been removed throughout the tunnel by scraping the conductors with specially made shoes. It is not yet evident that the method employed to take the current from the conductor is a satisfactory one.

The Efficiency of Boilers—A Criticism of the Society's Standard Code of Reporting Boiler Trials.*

There is no common matter about which there are fewer accurate and scientific ideas than the subject of boilers, their actual performance, the reasons therefor, the proper criterion by which to judge of their performance, and the economical merit of a boiler. There is also, in the minds of many who ought to know, no idea of the limitations of boiler evaporations, nor of the magnitude or nature of boiler losses. Extraordinary, if not impossible, guarantees are made, and evidently only for the purpose of securing contracts, and trusting to good fortune to escape a penalty. Such guarantees produce injury to other boiler makers, mislead the consumer, later causing him, when he finds out the impossibility of the guarantee, a great deal of annoyance, if not expense, and are, in fact, immoral.

It is not uncommon to use a particularly rich quality of coal on a boiler trial, and to use the result, which is wonderfully good, in advertising the boiler, and thus to deceive the public. A poor boiler tested with good coal may give a greater evaporation than a good boiler with poor coal.

Results may be vitiated for comparison by drying samples of coal, for moisture allowance, different lengths of time. Sometimes the sample is dried 24 hours, and thus is favorable to the boiler, while other samples may be dried 6 or 8 hours. In order to do away with this difficulty I recommend that a well-selected sample, weighing 6 or 8 lbs., be dried 6 hours in a clean pan placed on the boiler flue. This sample should be weighed with a scale which is accurate to quarter ounces.

Considerations of this kind lead to the inquiry, how can a boiler trial be reported so as to show the true value of the boiler as a generator of the possible heat in the fuel

*Extracts from a paper presented at the Detroit meeting of the American Society of Mechanical Engineers, by Mr. F. W. Dean.

and as an absorber of the heat generated, independent of the quality of the fuel? The reply to this question is that its "efficiency" must be determined and reported. The definition of "efficiency" is as follows: The efficiency of a boiler is the ratio between the total heat which any given coal can generate by complete combustion, and that part of it which is absorbed by the water and steam heated and generated.

The next question is: How can dealers be made to base their guarantees upon efficiency, and how can purchasers be made to understand the meaning of efficiency? The answer is: Through the efforts of this Society.

This naturally leads to a discussion of the report by a committee of and to this Society, recommending a standard method of making and reporting boiler trials, as printed in Volume VI. of the *Transactions*.

That report is emphatic in expressing the desirability of a standard method, and particularly of the importance of expressing the value of the boiler. On page 259 the report says: "The scheme must also be so complete that, if carefully and exactly followed, the precise value of the boiler may be ascertained with certainty." Yet after this the word "efficiency" is scarcely mentioned, much less recommended as a measure of value, thus wholly missing the point. Wherever used it is in the most general sense. In one discussion it appears with its proper signification.

The report recommends, on pages 262–3, that its standards of power and economy be respectively the "commercial horse power" and "unit of evaporation," both of which are explained. It then says, page 263, that the relative economy of boilers is expressed by the number of units of evaporation obtained by a pound of combustible. Nothing could be farther from the truth. In fact, this conveys only the roughest idea of the relative economy of boilers, and takes no account of the fact that combustible as well as coal varies in heat value per pound. In a recent case that came under the writer's notice a pound of combustible contained 14,177 units of heat, and another 15,398. The latter is 8.6 per cent. greater than the former, and therefore ought to evaporate at least 8.6 per cent. more water from and at 212 degs. If the evaporations per pound of combustible in the two boilers using these coals had been equal, according to our society's code they would have been equally good boilers. It is evident, however, that they would have been far from equally good. In one case the evaporation was 11.85 lbs. on this basis, while with the better coal in the same boiler it would have been 11.85 × 1.086 = 12.87, thus changing it from a fairly good to a remarkably good boiler. The boiler using the better coal gave a better result than it is in general entitled to, and has apparently misled both its designer and builder, as well as the public, while, if its merits had been judged by its efficiency, it would have taken its proper place as a steam generator.

Next to be considered is: How can the efficiency be determined? This is determined by knowing the number of units of heat that a pound of coal and a pound of combustible will give out when burning under perfect conditions, and the number of heat units that the water evaporated has received In doing this the heat that goes up chimney should not be deducted from the possible heat of the coal, as is sometimes done, for different boilers allow different amounts to escape. It should be the function of a boiler to reduce this heat as much as is consistent with the temperature of the steam.

There are two methods of obtaining the heat value of the coal, one by burning a representative sample in some kind of oxygen calorimeter, and the other is to analyze the coal and equate the elements with their heat values. The oxygen calorimeter is generally preferred but as it is considered to be the better the nearer its result comes to that computed from the analysis, the writer prefers to use the analysis and thus avoid the imperfections of the calorimeter. As most engineers will wish to have their coal analyzed, it is best to use this for heat value and avoid the expense of a calorimeter determination. This is a point, however, that the society must determine.

Our standard method recommends coal analysis, but is silent as to what use is to be made of it. Neither does it mention the oxygen calorimeter, nor does it speak of computing the heat value of the coal from the analysis.

Having now called attention to the defects of the standard method of making trials and judging of the value of boilers, I wish to add that wherever there is an economizer, a boiler trial should in general include a determination of the effect of the economizer. These devices are now very common, and in many cases have sufficient heat to work upon to convert a wasteful plant into an economical one.

Concerning the standard form for reporting trials, it has an insufficient number of items, and also contains some useless ones. To criticise its wording and items: Of what value are the words in item 26, "and apparently evaporated"? In item 29 the word "equivalent" is superfluous. In item 31, the words "from actual pressure and temperature" are superfluous.

The item 34, "Commercial Evaporation," is of questionable value and should be dropped.

In items 36, 37 and 38 the assumption of one-sixth refuse should be abandoned; for why, henceforth, assume the refuse?

Item 38 should be changed from "Per square foot of least area for draft" to "Per square foot of boiler-tube opening." This item is of little or no importance, and as it is in general impossible to determine the least area for draft, it is best to have something easily determined, definite and possibly of some use.

The items 40, 41 and 42, so far as they depend upon "temperature of 100 deg. F. into steam of 70 lbs. gage pressure," should be abandoned, as these are condition of past practice, now not often met and soon to be extinguished. Here, also, the "least area for draft" should be replaced by "tube opening."

The commercial horse power unit has become fixed and valuable, but should be stated with reference to the evaporation from and at 212 deg. F. only, as 100 deg. F. and 70 lbs. are obsolete. In order to avoid the 1/9 in 34½, it is recommended that 35 be used. This differs from 34½ by less than 1½ per cent., and as the horse power of a boiler is very flexible, the proposed change is not harmful in any respect nor misleading, when comparisons are made between powers by the old and proposed units. Its history can be readily traced by future students.

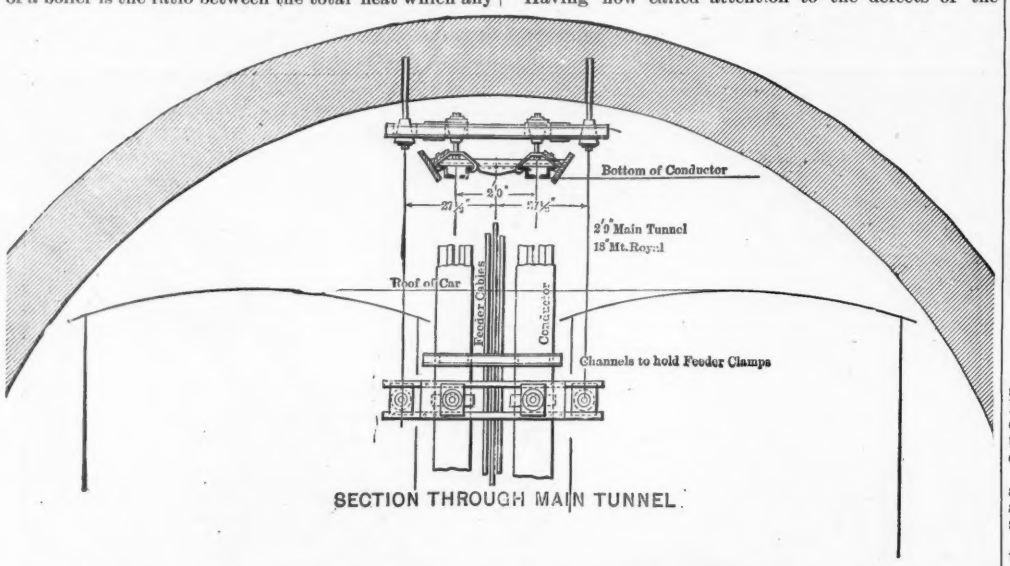
It is of great importance to determine the unit for comparison on an efficiency basis. It would be commercial if the efficiency on coal were taken, but this would require picking out unconsumed coal from the refuse, and would assume that equal percentages of unconsumed coal fell through the grates in different cases. It is, therefore, best to use the efficiency based on combustible, thus:

$$\text{Efficiency} = \frac{\text{Heat usefully absorbed from 1 lb. of combustible.}}{\text{Heat value of 1 lb. of combustible.}}$$

This also is the quantity on which the guarantee should be based, and the contractor should have the following clause in his specifications: We guarantee that our boiler will give an efficiency of —— per cent. referred to combustible consumed on a test of —— hours duration.

Unless this Society shall take a stand upon this matter and revise its standard method it will not be to its credit, as the present code has become open to criticism of this sort by the passage of time.

An improved form of blank is appended, embodying the changes suggested in reporting boiler trials. [Blank not reprinted here.—EDITOR.]



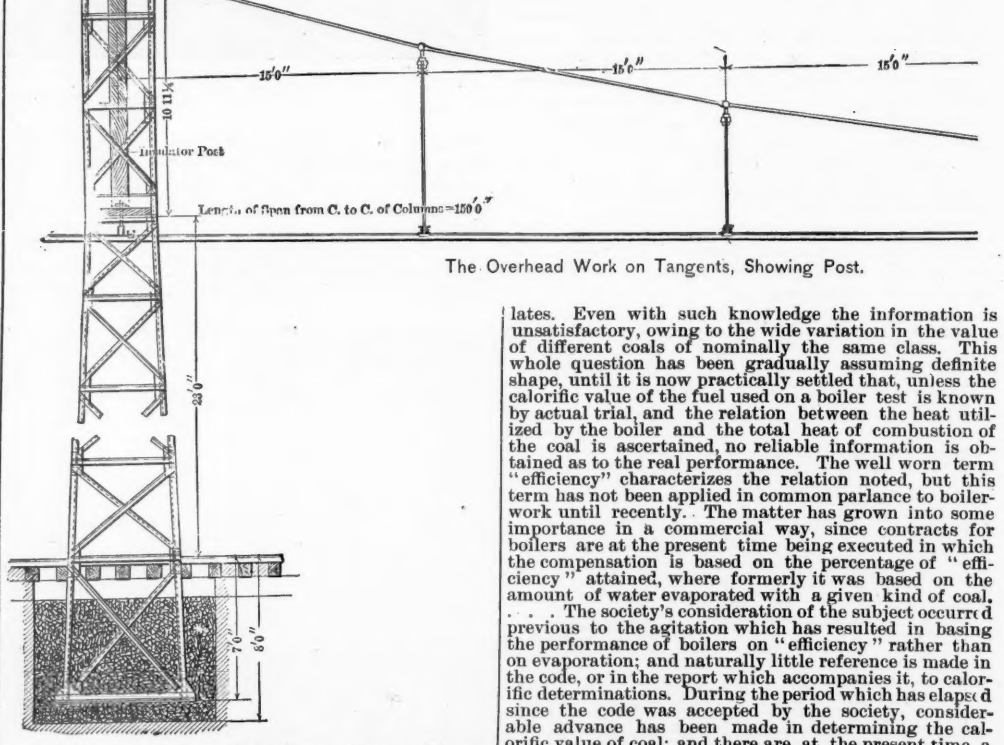
SECTION THROUGH MAIN TUNNEL.

DISCUSSION BY MR. GEO. H. BARRUS.

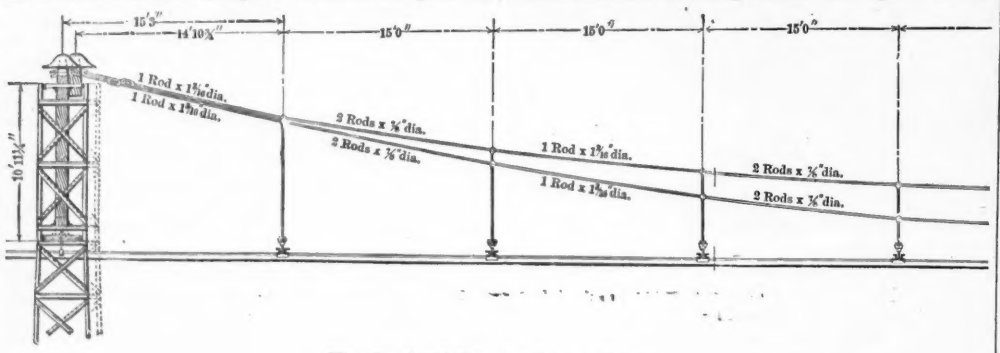
It has been understood for a long time that the evaporative performance of a boiler, expressed in terms of water evaporated per pound of coal, or even per pound of combustible, furnishes no adequate idea of its efficiency as a steam generator, unless some knowledge is had of the general character of the fuel to which it relates. Even with such knowledge the information is unsatisfactory, owing to the wide variation in the value of different coals of nominally the same class. This whole question has been gradually assuming definite shape, until it is now practically settled that, unless the calorific value of the fuel used on a boiler test is known by actual trial, and the relation between the heat utilized by the boiler and the total heat of combustion of the coal is ascertained, no reliable information is obtained as to the real performance. The well worn term "efficiency" characterizes the relation noted, but this term has not been applied in common parlance to boiler-work until recently. The matter has grown into some importance in a commercial way, since contracts for boilers are at the present time being executed in which the compensation is based on the percentage of "efficiency" attained, where formerly it was based on the amount of water evaporated with a given kind of coal. . . . The society's consideration of the subject occurred previous to the agitation which has resulted in basing the performance of boilers on "efficiency" rather than on evaporation; and naturally little reference is made in the code, or in the report which accompanies it, to calorific determinations. During the period which has elapsed since the code was accepted by the society, considerable advance has been made in determining the calorific value of coal; and there are at the present time a number of parties who are engaged in making these determinations in commercial work. Just now, also, there are in progress, in more than one college laboratory, investigations upon this subject, having in view a comparison of different methods of making calorimeter tests, and of different forms of instrument. It is evident that sooner or later these investigations will put the Society's code "behind the times," if it has not done so already; and there is immediate need of a revision of the Standing Code of Rules to bring them up to date. I am therefore in hearty sympathy with Mr. Dean's recommendation, in so far as it relates to amending the work of the former committee so as to include the methods to be followed in determining efficiency. It would be well, if such action is taken by the Society, to empower the committee to investigate the subject of coal calorimetry, so that they may be able to recommend a standard method of conducting this important part of a boiler test. As to the *personnel* of the committee, it seems to me that, so far as may be, it should include the members of the former board, for their work is to be commended, from whatever standpoint it is viewed.

I cannot indorse the recommendation of the paper that the calorific determination be made from a chemical analysis instead of a calorimeter test. A chemical analysis for this purpose is objectionable on the broad ground that the work must be intrusted to a chemist. The engineer should be responsible for the efficiency test from first to last. He cannot, as a rule, satisfy himself regarding the chemical determinations so as to be able to vouch for them. The person conducting a boiler test should be capable of judging from his own knowledge as to the correctness of all the data. The process of determining the calorific value of coal in an oxygen calorimeter is quite as simple and easily comprehended as the boiler test itself. This reason alone furnishes sufficient ground for using the direct determination of the calorimeter, instead of the indirect method based on analysis, which, at best, is complicated and uncertain.

[An abstract of further discussion was published by us last week.—EDITOR.]



The Overhead Work on Tangents, Showing Post.

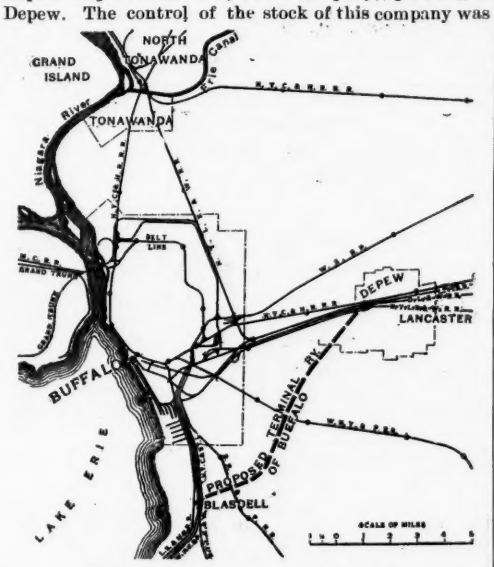


The Overhead Construction on Curves.

The Terminal Railway of Buffalo.

The Railroad Commissioners, of New York, gave a hearing at Albany, on Tuesday of this week, to the attorneys of the Terminal Railway of Buffalo, and of the Depew & Tonawanda and Depew & Southwestern companies, on the applications made for authority from the Commissioners to build the roads as required by the general railroad laws of the state. Each company proposes to build a line, connecting the trunk lines entering Buffalo from the east with the Lake Shore & Michigan Southern, and the roads entering the city from other directions. The accompanying map will show plainly the object of the roads and the advantage to be gained by a line which will enable through trains to avoid the tedious journey through the streets of Buffalo. It will be noticed that the present lines of the New York Central and other companies are all located for considerable distances through the built-up portions of the city, and along busy streets. A still better idea of the location of the tracks in the city limits will be gained by reference to the map of Buffalo published in the *Railroad Gazette*, of March 29, p. 196, in connection with an article on the plans for the removal of the grade crossings in the city.

The Terminal Railway is the only company which has yet filed a map of its proposed road, and therefore is the only one shown on the map. That line is projected by Mr. H. Walter Webb, Third Vice-President of the New York Central & Hudson River road. The project is understood to have no present identification with that company, being a private enterprise of Mr. Webb, in connection with the development of the plans of the Depew Improvement Co., a land company, operating at Depew. The control of the stock of this company was



Proposed Terminal Railroad, Buffalo.

recently secured by Mr. Webb and his friends. The present directors include, besides Mr. H. W. Webb, Dr. W. Seward Webb, H. McK. Twombly, John Jacob Astor and C. M. Depew. The improvement company owns about 930 acres of land at Depew, intersected by four trunk lines, with the West Shore just to the north.

The Terminal Railway Co. has been organized with the following officers: President, John A. Spoor, Chicago; Secretary, Henry L. Sprague, 21 Broad street, New York City; Treasurer, Arthur G. Leonard. The directors are: John M. Brinker, Buffalo; Robert W. Jones, Buffalo; H. L. Sprague and Algernon M. McKay, New York; Charles F. Smith, A. J. Grant, Frank Hammond, William Baker, of Buffalo; and Charles E. Harmon, of Camillus, N. Y. Mr. Spoor is General Manager of the Wagner Car Co.; H. L. Sprague, the Attorney and Secretary, who was attorney of the Adirondack & St. Lawrence road; and Mr. Leonard, Private Secretary to Mr. H. W. Webb.

This line will be about 11 miles long, its western terminus being Blasdell, as shown, a station on the Lake Shore & Michigan Southern, just southwest of the city limits. There is little doubt that if the Railroad Commissioners grant the required authority to build this line, its construction will be at once taken up and the road built this season.

The Depew & Tonawanda and the Depew & Southwestern both have the following incorporators: Wilson S. Bissell, Arthur D. Bissell, Herbert P. Bissell, Martin Carey, W. Burnet Wright, Jr., William G. Meadows, Mark Lee Luther, Francis M. Taylor, James Murphy, W. A. Douglas, Henry A. Dann, Walter P. Cooke, Clarence W. Hammond, Edward T. Lee and Albert A. Laycock. These two companies are supposed to be supported by the Lehigh Valley interests. The articles of incorporation of the Depew & Tonawanda give the proposed route from the village of Depew, to a point near Tonawanda, the length being 10 miles. The articles of incorporation of the Depew & Southwestern give the route as from Depew to Blasdell, a distance of 10 miles.

National Association of Local Freight Agents.

The eighth annual meeting of the National Association of Local Freight Agents' Associations was held in New York, June 11, President E. E. Zeigler (Pennsylvania R. R.), of Pittsburgh, in the chair. Mr. Lot Brown (C., B. & Q.), Chicago, was Secretary. There were 129 delegates, representing 27 local associations out of a total membership of 44 associations. This National Association is made up of local organizations of the local freight agents of cities having at least 50,000 population with three or more railroads. It was organized at St. Louis in 1888 by representatives of seven local associations, and has rapidly increased in membership and importance. There are now 417 local members representing railroads traversing 50 states and territories, and the association is generally most favorably regarded by managers.

The members were welcomed to New York by Mr. A. A. D. Smith, Local Agent of the West Shore, and by Mr. Percy R. Todd, General Traffic Manager of the same road. Mr. Todd said he had served in many capacities, but not as local freight agent, a fact which he had often to regret when he found himself unfamiliar with classifications. Superintendents McCoy and Wattson also made happy speeches.

The regular reports were read and then came a report on Uniform Way-bill by Mr. Jas. V. Braden (P., C., C. & St. L.), Wheeling, W. Va. The report recited the work of the committee in carefully gathering ideas on the subject, and copies of forms of way-bills now in use in this country and England.

The committee recommended: 1. A marginal indexed uniform classification. 2. That tariffs for each line be made uniform as to size and color. 3. Through billing when possible, settlements to be made through the auditor's office with a constant view of extending the system. 4. The adoption of a uniform manifest blank to be known as Local Freight Agents' form, L. F. A. No. 1, a printed copy of which was submitted.

The new form met with great favor from old as well as young agents. It was unanimously endorsed. The committee was continued another year with instructions to take up the subject with the Railway Accountants' Association.

The Committee on Uniform Expense Bill, Lot Brown, Chairman, recommended the adoption of the form in use by the New York Central, the Pennsylvania Co., the Lake Shore, the Burlington and the Wabash. These are of the same size, 5¾ × 8½ in., and the wording is practically the same. As some 18 other roads use forms of same size, but with wording a little different, it was hoped the agents would keep up the interest until the form recommended should be universally used. The recommendation of the committee was adopted and the Secretary instructed to forward a copy of the report to the Railway Accountants' Association, with the recommendation that the form be adopted as the universal Expense Bill.

The next order of business was the discussion of topics suggested by local associations. The topic, "Is filing a lien by railway companies for transportation charges, when delivery is made to U. S. bonded warehouses, sufficient protection for the transportation companies' charges?" was opened by Mr. Korn, of Cincinnati, followed by a general discussion, from which was elicited the fact that while the laws of the United States provide that a customs officer shall immediately take charge of freight transported in bond, and he generally has it removed from the possession of the carrier to a government warehouse, this law is inadequate to protect the carrier in collecting transportation charges. The customs officer is under bond to the government for the collection of import duties only, and the railroad companies are under bond for the faithful performance of duties as common carriers, but there is no provision for liability to the carrier for recompense for its services. Customs officers usually protect the agent against loss, but in some instances loss has arisen by their carelessness. A committee of five was appointed to communicate with the Secretary of the Treasury, looking to the settlement of the liability for transportation charges. The Chairman of this committee is Mr. John L. Korn, of Cincinnati.

"Storage of Car Load and L. C. L. Property in Depots or on Tracks," was ably discussed by many members and by several members of the American Warehouseman's Association, including Mr. Godley, of Philadelphia, President, and Mr. Price, Secretary, of Cleveland. It appeared that the conditions were much the same in all parts of the country; freight stations full, cars full and tracks full, resulting in an unjust discrimination against the better class of patrons, who own warehouses for the storage of their own goods, in favor of that class of merchants owning a desk, ink and a pen, who make a convenience of the carriers' warehouses for storage. Cincinnati was the only association reporting an organized system of sending goods to store. That system provides that all goods shall be sent to store four days after arrival and notice to consignee, and it is left to the Secretary of the Cincinnati Freight Association to enforce the rules of the agreement. The members from Cincinnati reported that the working of the system was very satisfactory to the railroads and also to the public, and none were found willing to go back the old system of no storage. It was resolved: "That it is the sense of the Association that property arriving in carloads be held on track two days without car service, two days charging car service, after which it be sent to public warehouse; less than carloads to be, after holding four days, sent to public store. These rules not to apply to export freight."

The topic, "Should not the receiving road accept all interchange business, regardless of the condition of the cars, and either repair or transfer the cars at their expense?" was discussed by Mr. Rathfon, of Buffalo, and others, a great variety of opinions being brought out. A committee of five later recommended that the receiving road accept all interchange business regardless of the character of the traffic contained in them and transfer the same at their expense, but that the expense for repairing cars must be governed by Master Car Builders' Association rules.

The length of furniture cars, carriage cars, etc., was next discussed, and it was

Resolved, That it is the sense of this Association that single consignments of freight, of whatever class, should be billed at carload rate whenever such consignments exceed the visible capacity of the car tendered by the carrier, and that all excess of such consignments should be billed at carload rate." The evil tendency of the get the-business spirit of the times was thoroughly exposed by the discussion.

The desirability of adopting a standard form for use in tracing freight was discussed and a committee of five, with Mr. Eyman, of Milwaukee, as chairman, was appointed to report at the next annual meeting.

The Kansas City Local Freight Agents' Association was described by Mr. Calkins, of that city. That organization has instituted reforms which have saved the roads upwards of $100,000 a year. Ample data were given to verify this statement. The Association is formally recognized by the Kansas City Superintendents' Association, which has resolved "that this Association agrees to pay the legitimate expenses incurred by the Local Agents' Association."

The practice of furnishing clerks to check freight at depots of connecting lines, private tracks and warehouses, was generally condemned, first by Mr. Anderson, of St. Louis, and a number of other delegates and a vote was passed condemning the practice.

The work of a freight station was the subject of a paper by Mr. Braden, of Wheeling, W. Va. He recited reasons for uniformity of details of station work at stations on the same road and said the systems in use were the result of the agents' own invention, guided by his own experience alone, instead of a well defined system based on the experience of many. He said if the real differences were fully familiar to the officials, the revelation would be a great surprise. In this connection a paper was read by J. B. Dorrington (P., C., C. & St. L.), of Pittsburgh, giving his experience with the piece-work system in handling freight, which has been devised by his Superintendent, Mr. J. J. Turner. The check clerk keeps a careful record of the tons handled by his force, paying them by the ton instead of by the day. This resulted in a saving of 20 per cent. in cost the first week, which was the last week in January. This saving was gradually increased as the men became more familiar with the requirements, until in May it reached 27 per cent., and the cost per ton was reduced from 14¾ cents in January to 10¾ cents in May. In four months the saving to the company was $872, while at the same time better service was secured and the increase in earnings to each man was an agreeable surprise.

The following officers were elected for the ensuing year: President, Lot Brown (C., B. & Q.), Chicago; Vice-President, J. A. Lindsay (L. & N.), St Louis: Secretary, James V. Braden (P., C., C. & S. L), Wheeling. Treasurer, C. H. Newton (Wabash), Fort Wayne. The next meeting is to be Tuesday, June 9, 1896, at Chicago, Ill.

The social features of the meeting, heretofore noted in the *Railroad Gazette*, were pleasant and were largely attended. The kindness and courtesies of the New York railroad and steamship men were the subject of enthusiastic expressions of appreciation.

TECHNICAL.

Shorter Time to Paris.

The passengers of the Hamburg-American Steamship "Furst Bismarck," which sailed from New York on June 27, on her first trip to Cherbourg, arrived at Paris 7 days after leaving New York. The time from Cherbourg to Paris has beenreduced by the putting on of a fast train. This is the first time that the trip from New York to Paris has been made within 7 days.

Progress of Work on the Boston Subway.

The concrete work on the Public Garden section of the subway is almost completed, only two more sections of the invert remaining to be put down. The retaining walls for the open incline are almost finished and the cap-stones are being put in place. Excavation is going on toward the Charles street line from the Common side. The grading of the Public Garden on the north side of the retaining walls is about done. One reason for delaying the work on the Tremont street mall has been that the iron work was not ready. This has been relieved by the arrival from the Pennsylvania Steel Co. of a heavy consignment of I-beams, etc.

The Nicaragua Canal.

The Nicaragua Canal Commission on board the Montgomery was lying in port at Key West, Fla., July 15, and a reporter tried to get at them, but without success. The Secretary of the Commission, Mr. Stoddart, gave the reporter a note, saying very naturally that it would not be proper to furnish information with regard to the report in anticipation of the presentation of the report to the President. He said that the Commission had had a fortunate trip, having had no mischance or illness of of any kind. Before coming back to the United States the party went carefully over the Panama Canal from Colon to Panama and back. A newspaper reporter, writing from Colon, professes to have got information which indicates that the Ochoa dam plan will be very seriously criticised by the Commission.

RAILROAD GAZETTE

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EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

Last week the *Iron Age* published its usual monthly furnace statistics showing the weekly capacity of furnaces in blast on July 1. One hundred and eighty-five furnaces had a capacity of 171,194 tons as compared with 172 furnaces the preceding month with a capacity of 157,224 tons. In fact the capacity of furnaces in blast has not been so great any time in two years as on the first of this month. June 1, 1893, it was 174,029 and it then fell rapidly, reaching the minimum of 62,517 June 1 of 1894. It is said that preparations are making to resume operations at still other furnaces, and that the capacity on Aug. 1 will be greater than now. Moreover, the improvement is not confined to any one section, but seems to be well distributed. This is surely encouraging, and we may add to it a very encouraging crop report. The recently published statement of the Agricultural Department, showing the condition of crops on July 1, gives the condition of corn 99.3 and spring wheat 102.2. The winter wheat condition, however, is low, namely, 65.8. Barley and potatoes also show a very high condition and oats a good deal higher than last year, namely, 83.2, but still not especially favorable. One must bear in mind, also, the further great fact that the acreage in corn is the greatest ever planted. The *Chronicle*, summing up the acreage as nearly as possible for the great corn growing States, concludes that the increase over last year is almost 20,000,000 acres, or 31½ per cent. This is one of the most important matters to be considered in speculating as to the future. Of course corn is not out of the way of bad weather yet, but every week that passes makes more and more probable that we shall have a stupendous corn crop.

The *Chronicle* made last week its usual monthly report of gross earnings, this time for June and for the half year. Reports from 126 roads for six months, and for 63 roads for five months, a total of 189 roads, showed a gain in gross over last year of 3.23 per cent. This is on an aggregate of almost $392,000,000 earnings. For the month of June the increase in gross earnings is 8.29 per cent., the highest for any month yet reported this year. In May the gain was 6.38 and in April 4.65. Everyone knows that these comparisons are made with a very bad year; yet when taken with the other hopeful signs seen on every side they may properly cheer us up a good deal.

The Canadian railroad accident is one more proof that there is nothing so dangerous as an excursion. The most deadly accidents in railroad history have been on excursion trains, and this risk remains. Excursions mean deranged time-tables, overworked engineers and trainhands and an inevitable slackening of discipline. When railroads have reached their final development no manager will consent to any excursions. They are a costly sacrifice of safety and passenger rates for known risks and doubtful profits.

The foregoing, from the Philadelphia *Record*, is a plausible and possibly a sound conclusion, but the premises are stated in a way that make the argument look like guesswork. In the first place it is not certain that the percentage of excursionists killed is any larger than the percentage of ordinary passengers. If by "excursion" the *Record* means extra passenger train, it should look at the hundreds of such trains run every year on the Pennsylvania Railroad without mishap. A special train can be sent out from Jersey City to Philadelphia on half an hour's notice, almost any day, without producing "deranged time-tables" or any other inconvenience. Engineers and trainmen are not usually overworked when excursions are run, on any road, unless the slight excitement due to being engaged in unfamiliar work (when freight men have to handle passenger trains) be called overwork. There is not a slackening of discipline when extra passenger trains have to be run, but a tightening, and unskillful methods in the tightening process cause much of the trouble. Of course we are not excusing collisions; on the contrary, we greatly deplore the fact, often evident, that a collision which happens without doing much damage does not seem to have much effect as a warning upon the managers of the road interested. If every passenger train had carried 100 passengers in its two rear cars, we should have heard of probably half a dozen cases like Craig's Road during the past year and a half Railroad discipline, in some of its phases, is adjusted to protect *passengers* when it ought to be adjusted to protect *trains*, and it is an inevitable result of the force of habit that the men come to be more cautious about running into the rear of a train that is *known* to contain passengers than they are with relation to other trains. The negligent engineer at Craig's Road knew that there was a passenger train ahead of him, but the knowledge was not a fixture in his mind like the knowledge of the regular passenger trains that he was in the habit of looking out for every day in the year. To say that the perfect railroad will have no excursions is about the same as saying that managers will refuse to enlarge their facilities for growing business.

The considerations in the foregoing note are general. They do apply in many cases, as railroad officers can testify from their own experience; but the Craig's road case is unusual and seems likely to go on record as a very remarkable case. The engineman and fireman were both killed, and it will probably never be known just what the trouble was, but it looks as though both men must have been asleep. The steam was not shut off and the air-brakes were not applied. Neither the bell nor the whistle was sounded, although the train was approaching a station. The night was clear and the semaphore could be seen for over four miles. There is said to be ample evidence that the semaphore light was burning properly, as were three tail-lights on the passenger train. The semaphore was 16 telegraph poles, say 2,400 feet, back of the rear end of the foremost train. The second train did not leave St. Agapit until the first one had reached Craig's Road, passenger trains following each other at night being always thus kept a station apart. The experts of the British Board of Trade, or, indeed, any of our conservative English friends, probably will say that this is a warning to American roads to heed the lessons of English experience; the lesson that dependence upon a single fixed signal to protect a train is not infallible. The highest standard in England requires that the first train shall pass the distant, the home and the starting signals at station B before the second train is allowed to leave station A. Those who have read the English uniform code for block signal operators, printed in the *Railroad Gazette* last month, will have noticed the great particularity with which this rule is prescribed. In the new code the requirement is so worded as to require that the train shall have passed a *certain distance* beyond the home signal, instead of that it shall have passed the starting signal. This is necessary to make the rule cover places where there is no starting signal. It is true that such a precaution may some time prevent a collision; and the Englishmen have a convenient way of suspending its use, whenever it would delay traffic, by introducing their Rule 5; moreover, the relaxation provided for by Rule 5 may easily be carried farther than the printed provisions of that rule prescribe; but as the reports of the Grand Trunk collision indicate that the runner would probably have passed three signals as blindly as he passed one, most railroad men will look for the lesson of this case in the habits of the engineman. He had been off duty for rest 10 hours before going to work, and had been on duty only 8¼ hours when the collision occurred. Whether he actually did rest, whether he was in good health and whether he was used to running passenger trains, has not transpired.

A Standard of Efficiency for Boilers.

In Vol. VI. of the *Transactions* of the American Society of Mechanical Engineers, 1884–1885, is printed the report of the Committee appointed by that Society on a Standard Method of Steam Boiler Trials. The advance in steam-making apparatus has been so important since that standard was selected that it is no longer adequate, and it was voted at the Detroit meeting last month that a committee should be appointed to revise the standard and make special investigations and recommendations about the analysis of fuels. The subject was brought up in a paper by Mr. F. W. Dean, entitled "The Efficiency of Boilers: A Criticism of the Society's Standard of Reporting Boiler Trials," which is printed in this issue.

One of the recommendations in the paper is that a chemical analysis be used as a basis, but the discussion brought out facts to show that the chemical analysis is unreliable and that a proper form of combustion calorimeter is better; although a test in a standard boiler on the plan as outlined by Professors Denton and Jacobus is much better than any other, as it takes in account the mechanical properties of the fuel. It has been shown that the slag, ash and moisture have a detrimental effect over and above the dilution of the fuel. That is, while these take the place of combustible matter, and thus reduce the heating power of the fuel, they also interfere with proper combustion by clogging the fire and obstructing the mixing of the fuel and air. It was brought out that the nature of the carbon compounds in the fuel have much to do with the heating power, and this is not taken into account in the ordinary chemical analysis. A summary of the discussion will be found in the *Railroad Gazette*, July 5, 1895, p. 441, and those who are interested can get the complete account from the Secretary as soon as it is printed.

Before this in the *Railroad Gazette* the necessity for an actual test of the fuel in bulk, under a standard boiler, has been shown, especially for locomotives. Up to this time the effect of the presence of foreign ingredients in coal, over and above the reduction of the heating power, has not been appreciated by engineers generally, but recently the introduction of large electric plants, in sections where there is a cheap fuel of poor grade, has brought out this fact more prominently.

Now boilermakers find it very difficult to make proper guarantees of performance, and purchasers have to look sharp or they find that the expert trials give far better results than they can get in practice. The wide range in fuels, coal more particularly, from practically dry, with 2 or 3 per cent. ash, to damp with 12 per cent. of moisture, and 25 per cent. of ash, leaves room for much sharp practice, which is sometimes resorted to as a matter of advertisement and to secure contracts. This margin, in which the boiler agent can exercise his skill in befogging the purchaser, cannot be narrowed by a chemical analysis to a point where there is any certainty of security for the purchaser of boilers under a guarantee. The combustion calorimeter is a better guide under most circumstances than the chemical analysis, but the examination of the fuel in bulk is the best of all. Whatever plan is recommended by the Society, there will be conservative purchasers who will insist on a bulk examination, by actual test, of the fuel used in the expert trials, to see that it is no better than that specified in the contract and guarantee. Conservative boilermakers will be glad to get a standard examination that will give them a basis of fact, as it will relieve them from the annoyance arising from the sharp practice of their own agents and the agents of others.

The author of the paper which brought out the discussion has emphasized the woes of purchasers, caused by what he calls "impossible guarantees;" but chemical analysis is not a panacea for all the ills of this sort, nor, in fact, will any coal examination enable a purchaser who is not an engineer to get on without expert advice. Public commissioners of towns and cities are perhaps the most common purchasers under guarantees, and no standard code of tests will make a city alderman of the ordinary stamp a safe steam expert. It is but just to the steam engineer to say that if the public is deceived by a boiler report it is because it is trying to be its own doctor, and not because "there is no common matter about which there are fewer accurate and scientific ideas than about boilers."

It is not to be accepted without protest that the educated and experienced steam engineer does not know what an "impossible guarantee" is. Those who have been deceived by accepting results of boiler tests when the character of the fuel is not certified to by a reputable engineer have experienced the results of defective judgment. Certainly no engineer would accept for important work, where much money is in-

volved, an incomplete set of boiler data. If the inexpert purchaser does so, he puts a premium on rascality and may suffer from the false economy arising from the "penny-wise and pound-foolish" plan of trying to save the fee of the expert steam engineer. We are not quite ready to agree with Mr. Dean that "there is no common matter about which there are fewer accurate and scientific ideas than about boilers," mainly for the reason that ignorance in this matter is confined mostly to those who are not, and do not pretend to be, steam engineers.

A Railroad to Uganda.

A month ago the British House of Commons passed by a large majority a bill which is likely to result in the commencement, at least, of the railroad from Mombasa to Uganda, which has been talked of for so many years. The reasons for building such a railroad, the results to follow, and the probable date of its commencement and completion, are matters little understood, and in fact largely conjectural, even among the best informed. We may safely say at the outset that it will not be built primarily as a commercial railroad, that it will not pay fixed charges for a great many years, and that the time of its completion is as uncertain as any other matter of national policy under a popular government. On foreign affairs the traditions of the British Conservatives are liberal, not to say radical, and the traditions of the Liberals are conservative. Just now the Conservatives are distinctly on top; therefore we may expect that this African railroad will be pushed for a time at any rate; and it is an immensely interesting project, being closely related to the future of the whole Nile Valley.

Let us, therefore, briefly consider the project; where and what is it. its magnitude and cost, the reasons for building the railroad and its probable revenue. And in doing so, we shall go over some of the ground covered by us in writing on this subject a year ago.

The project is to build a railroad from Mombasa, about latitude 4° south, and about 39° 40' east longitude, on the Indian Ocean, northwesterly to the shore of the Victoria Nyanza. The lake terminus of the railroad would be a few minutes north of the equator and about 34° east longitude. In 1891 and 1892 a very careful preliminary survey of the route was made by four officers of Royal Engineers, under the command of Capt. Macdonald, R. E., and their report as submitted to Parliament is the one comprehensive and exhaustive document on this project in existence, and is the basis of all present calculations.

The length of projected railroad by the line selected after surveys covering over 2,700 miles is 657 miles. It ends at the northeasterly corner of the lake. From there it is proposed to run a steamboat along the northern shore, giving access to the most important parts of Uganda. The Imperial British East Africa Company, to which great trading concessions had been made by the British Government some years ago, began building a narrow gage railroad from Mombasa to Uganda. About seven miles of 2-ft. gage track was laid, and then work stopped. The company asserted that it was not worth while to build the railroad, and, indeed, that the country did not pay for occupation, and was only prevented from withdrawing entirely by receiving a subsidy from the British Government and another one from the Church Missionary Society.

The country to be passed over in this 657 miles is not difficult, topographically. An extreme height of 8,700 ft. is reached, but a ruling grade of 1.5 per cent. can be had throughout, except in some short distances, where it is proposed to use gradients of 2.5 per cent. and divide the trains. The maximum curvature selected is 10 deg. There are quite a number of streams to be bridged, but none of the bridges will be of great magnitude.

The gage chosen is 3 ft. 6 in. The estimated cost of the railroad is £2,240,000 sterling, say £3,409 per mile. This includes stations, water stations, a single wire telegraph line and rolling stock and it is proposed to lay the track with 50-lb. rails on iron sleepers. The equipment estimated for is 30 locomotives, to be used during construction, nine of which would be afterwards stored, leaving 21 in service. The cars would be composite passenger cars; that is with first and second-class compartments, individual third-class cars and light freight cars similar to those used on the meter gage railroads of India, the under frames 18 ft. long.

It is estimated that three trains a week each way, that is six weekly trains, running at a speed of 12 miles an hour, including stops, and running only by daylight, will handle all the traffic. Consequently the whole constrution and equipment can be quite inexpensive. If sufficient traffic should develop to run the required capacity up to four trains a day, running in daylight, about £2,200 per mile more would have to be spent in track, buildings, sidings and rolling stock. This railroad with a business calling for three trains a week each way, could be run at a cost of $1.56 per train mile, including maintenance expenses. The engineers estimate that it would not quite pay working expenses at the outset, and that it would fall £70,000 a year short of paying interest at 3 per cent. and working expenses.

We should suppose that the estimated possible traffic is presented in the report in its most favorable light. The country is inhabited from one end of the line to the other, as well as all the country tributary to its western terminus, by savages, whose needs and whose products are few and simple. The annual export trade to-day is about 25 tons, being entirely ivory, and the import trade must be a good deal less for it cannot cost less than a thousand dollars a ton (probably nearer $1,400) to convey material between the ocean and the lake. The revenues from outbound freight, which it is supposed might be secured soon after the opening of the railroad, would be drawn from a very small amount of wheat, about 3,000 tons of cheap grains and from about 500 tons of miscellaneous material (coffee, ground nuts, hides, etc.) and from a considerable live stock traffic. There is estimated a possible traffic of something less than a thousand tons a year of European stores and trade goods going in. Added to this is an estimated passenger traffic of 250 Europeans and about 10,000 natives, local and through; and finally there is an estimate of a subsidy of £1,000 a year for carrying the mails. It will be seen that this whole matter of the return is speculative to the last degree, and we should not be at all surprised if the railroad fell far short of the estimated earnings.

The fact is that it is now admitted by all who have any information at all on the subject that the railroad, if built at all, must be built purely for strategic and philanthropic reasons, and it is for the British public to decide whether or not these reasons are sufficient. We hope that the project will be carried out, and that the railroad will be pushed steadily to completion, although we doubt if there is any need for great haste in the matter other than to begin at once and push on steadily enough to demonstrate to the world that it is the fixed purpose of England to build the railroad. There can be no question that it is for the good of Africa that England should control the valley of the Nile from the great lakes to the Mediterranean, and the building of this railroad from the Indian Ocean to the great lakes would be an important step towards that complete control. There are some thousands of miles intervening between the head of the Nile and the its mouth which must be reconquered slowly and by great expenditure of money and blood before civilized control of the Nile is re-established, and it is quite probable that England will long hesitate to make that expenditure; but the occupation of Egypt on one hand and of the lake country on the other would put her in position to make this conquest of the Nile valley in the cheapest and most expeditious way, and would be a signal to the world that some day the conquest will be made. This is the chief meaning of the Mombasa-Uganda Railroad.

The original ticket scalper has been discovered; or at least the earliest one we ever heard of, one who flourished in Troy, N. Y., in 1853 or 1854. We find the story in a letter printed in a recent issue of the *Railway Age*, and the hero of it is Mr. Jonas Wilder, the writer of the letter, who is now 82 years old and lives in Tennessee. Several inquiries have appeared in print lately asking who invented the coupon ticket, and it now appears that these questions were asked with a view to seeing if there were any facts to controvert the claim that Mr. Wilder was this inventor, and according to his statement no rival has yet appeared. Mr. Wilder began railroading about 1845, in Vermont. In 1851 he was Western Traveling Agent for the Ogdensburg & Lake Champlain and the Central Vermont, visiting Chicago frequently. In 1852 he went to the Rutland & Washington, becoming its first superintendent. Within the next year or two roads were completed between Rutland and Albany, so that there was a through line from Albany to Boston, 30 miles longer than the Western and Boston & Worcester (now the Boston & Albany). This roundabout line, made up of six or eight different roads, got some freight but did not attract many passengers, and so Mr. Wilder conceived the idea of a single through ticket, which idea was soon expanded to include tickets to Chicago. He got up a form, with the facsimile of his name printed on each coupon, and he had a crude stamp to show the date and name of the station where sold. He had intended to cut a slit between each two coupons with a chisel, but when he found, from the first proof, that the printer had put dotted lines between the coupons, he asked him to raise the points enough to prick through the paper, and this was done. After going West to get the Buffalo & Erie and other roads to agree to honor the new tickets through to Chicago, Mr. Wilder came back and was going to start a thriving business, but just then a landslide half a mile long shut up his road. Rather than keep the western roads in suspense, however, he placed an agent in Troy, the *western terminus of his road*, who sold $2,200 worth of tickets in one month, detaching the coupon or coupons east of Troy. Thus we see that selling tickets just for the fun of keeping things lively on the street did not originate in the wicked mud holes of Chicago, but in the civilized East. Who would have thought that the first ticket bearing a false originating point would be found to hail from a Boston line! The Boston & Albany (direct line) soon caught on to the scheme and issued similar tickets. When Mr. Julius Movius took charge of the Great Western of Canada he became a prominent man in the traffic world, and did many things to promote the efficiency of the joint ticket system. Mr. Wilder also says that he began running refrigerator cars, for butter, between Ogdensburg and Boston in 1851. Eight cars were kept busy in this traffic the first season. Later he went to the Rutland & Washington, where he had 20 refrigerator cars built, and in the winter he used them, with stoves, for carrying potatoes.

The Michigan legislative bill compelling railroads to issue mileage tickets at two cents a mile, to be accepted on all railroads in the state, failed to become a law. This may not be very fresh news to our Western readers, but Governor Rich's statement of the reasons why he did not approve the bill, which has just reached us, deserves to be noted. This proposed law was one of the most crude and absurd of the hundreds of crude and absurd propositions that have appeared in the various legislatures during the present year. The drummers are working everywhere to secure a mileage ticket which shall be good on all roads, and in this case, so far as legislative action is concerned, they succeeded as fully as they could possibly desire; but their case seems to have been managed in a bungling fashion and the scheme defeated itself. Governor Rich did not receive the bill in time to veto it, but he withheld his signature and issued a statement of his reasons for so doing. In the first place, he pointed out that the similar law passed in Massachusetts, which in many repects was less objectionable, was decided to be unconstitutional by the Supreme Judicial Court of that State, on the ground that the effect of the law would be to take private property for the use and benefit of the public without providing adequate compensation therefor. The attempts of the Michigan lawmakers to avoid this error he believed to be ineffectual. The inconsistencies of detail were numerous. Every company, even logging roads, *must* issue mileage tickets. The conductor refusing to accept a book of another road was liable to imprisonment. The road must redeem the coupons of its own books, but there was no penalty for refusal. All roads must give bonds to secure such redemption, but this clause was so loosely drawn as to be of no value. The Michigan Central, the Lake Shore and the Detroit, Grand Haven & Milwaukee were exempted, on account of provisions in their charters, but with these three roads left out the law would have been a farce. Nearly every other road in Michigan is insolvent, and if they sold a lot of tickets it would be difficult, and perhaps impossible, to collect the money from them.

The death of Railroad Commissioner Stevens, of Massachusetts, imposes upon the Governor the duty of appointing to the commission a man of technical training, a thing which has not been done for a dozen years. Governor Butler in appointing Mr. Stevens in 1883, took little pains, doubtless, to inquire as to Mr. Stevens' ability as a techanical railroad man. Desiring to make an appointment which would please a certain class of men he accepted as sufficient the fact that the candidate was a locomotive engineer of good reputation; and Mr. Stevens' general character and ability were sufficient to lead successive Governors to reappoint him, without much regard for his technical ability. But the theory on which this commission was established—though we believe it is not embodied in the statute—was that there should be a lawyer, a business man and a "technical railroad man," and it is to be hoped that the Governor will bear in mind that a "railroad man" means something more than a locomotive engineer. We regret to see that so intelligent a paper as the *Springfield Republican* demands nothing higher than a man who "has served in the ranks of practical railroad service." Such service is of great value to a Commissioner, but it is by no means sufficient to give him the broad training necessary to deal with the varied questions that come before him for consideration and decision. This should be patent enough, and, indeed, is illustrated by the fact that the Massachusetts Board has employed a special bridge engineer, Professor Swain, for many years past. It is desirable that the practice should be continued of employing a specialist for such special work; but the "technical railroad man" should have a great deal of knowledge of railroad engineering in all its complications. The ability and standing of the Board before Mr. Stevens was appointed, when Mr. Clemens Herschel was the technical member, will be a good standard for the Governor to look to for an example in making the new appointment.

A letter from the Interstate Commerce Commission warning railroad officers not to assume that illegal contracts become legal by being filed with the Commission, has been printed in the newspapers throughout the country within the last week or two. It appears that this letter has been sent to all the prominent roads, and it is

occasioned by published statements that such and such roads "have formed a pool and have got it approved by the Commission." The Commissioners seem to have been moved to speak just at this time because the Central Traffic Association neglected to reply to a request for a copy of an eastbound freight contract. On June 14 Commissioner Blanchard sent to Washington the proceedings of the meeting of April 9, in which the roads voted that "the Commissioners of the Central Traffic Association have power to even up the Chicago roads that are deficient in their tonnage by withdrawing the roads that are over from soliciting in the market, and by the transfer of freight to the deficient roads when practicable, the lines in deficit to receive and forward the said tonnage." This implied that there had been some agreement as to what basis the tonnage should be evened up to, and the Commission asked for a copy of this agreement, but it was not forthcoming.

It was announced last week that the Delaware, Lackawanna & Western had reduced the freight rate on anthracite coal from the mines to New York Harbor to $1.25 a ton, a reduction of 15 cents, and to $1.75 a ton to Buffalo, a reduction of 25 cents. This caused considerable comment, and in view of the present strained situation was looked upon as an aggressive move, but on further reflection it seemed to be the general opinion that the tidewater rate was no lower than had been accepted for most of the coal carried by the Lackawanna for many months past. The new rate is about 40 per cent. of the price at which coal has been selling at tide water lately, and it is not believed that much of the coal transported has paid more than that. The new published rate serves to place the smaller shippers on an equal footing with the large ones. As this coal is interstate traffic, a person holding Puritanical views concerning obedience to the law would naturally inquire how it is that some shipments have been going at one price and others at lower prices; but no one seems to think of bringing up that question.

The Interstate Commerce Commission has decided to grant the request of the various railroads to extend the time within which the law of 1893, providing for the safety of employees on freight cars, shall go into effect. The ruling of the Commission is that the time within which handholds shall be put upon cars shall be extended to Dec. 1, 1895, and the time within which all drawbars shall be made of a uniform height shall be extended to Feb. 15, 1896. To enforce the law, the Commission say, would cause much confusion in railroad operation and much prejudice to commercial interests. It also appeared that the exercise of too great haste might result in danger to the men employed, and that a greater degree of uniformity in the placing of grab-irons, or handholds, would probably ensue from proposed conferences of railroad men.

At the March meeting of the Railroad Society in Berlin the engineer Staberow, of Dortmund, gave a detailed account of electric lighting of passenger cars as adopted and in use on the Dortmund, Gronau & Entscheder Railroad for more than a year. The management is satisfied with the results, both as regards effectiveness and economy. The whole cost of the installation, including structures, loading station and batteries, has been $8,712, the equipment covering 27 cars and 85 lamps. The cost for a 10-candle light per hour has averaged 0.65 cent, and, including 7 per cent. on the investment, 1.5 cents per hour.

TECHNICAL.

Manufacturing and Business.

The Hale & Kilburn Manufacturing Co. reports its works as very busy on car seats, especially the walkover style of seat. The orders in hand for this seat include the Platt System, the Big Four, the Cleveland, Lorain & Wheeling, the Boston & Albany, as well as the entire new equipment (20 handsome coaches) ordered of the Pullman Company by the Southern Railway; also about 25 cars for other lines.

The Ensign Manufacturing Co., of Huntington, W. Va., has received orders for the following Russell snow plows: From the Lake Shore & Michigan Southern, two double track plows; from the Western Maryland, two single track plows, and from the Michigan Central, one wing elevator plow.

New companies recently organized in Illinois include the following: Standard Railroad & Farm Fence Co, Joliet; capital stock $100,000; incorporators, William B. Ridgeley, Charles Fetzer and George J. Bellersheim.

Union Dock Co., Chicago; capital stock, $5,000,000; incorporators, William T. Harkness, Eric Winters and Leigh H. Jackson.

Electric Railway Construction Mfg. Co, Chicago; capital stock, $250,000: incorporators, John W. Jones, William Riley and Sterling P. Riley.

The Gilbert Car Works at Green Island, Troy, N. Y., were sold at auction July 3 for $72,000 to representatives of the Atlantic Trust Co., of New York, which held a mortgage amounting to $79,000 on the plant.

The Standard Coupler Company, of New York City, having a year and a half ago purchased all the patents and property of the Standard Car Coupling Company, the latter company has been dissolved by an order in the New York Supreme Court.

The General Transportation Company, of Chicago, capital stock, $200,000 has been chartered at Springfield, Ill., to operate street and other cars, dining, sleeping, buffet, rolling, freight and other cars; to manufacture electric light, heat, power, gas and machinery. Incorporators: Adolph Boysen, Henry C. Miller and Edmond F. Burton.

P. J. Ingoldsby, representing Rodriguez, Murray & Co., of Barranquilla, Colombia, is in Pittsburgh, where he expects to contract for a steel vessel to be shipped to South America and be used in the packet line on the Magdalena River.

The Nicholson File Co., Providence, R. I., has announced a material advance in the wages of employees. This increase will affect upwards of 1,000 hands, and was purely voluntary.

Iron and Steel.

The Otis Steel Co. has given notice of a 10 per cent. increase in wages, beginning from July 1. The notice affects all departments. There are 800 men now employed at the works.

The new purchasers of the Mountour Iron & Steel Works, Danville, Pa., the Reading Iron Co., are making preparations to operate the plant.

After a short idleness work has been resumed at the American Sheet Iron Mill, Phillipsburg, N. J. New machinery has been put in and there are enough orders on hand to keep the plant going steadily for a year.

The number of men employed at the Pennsylvania Steel Co.'s works at Steelton, Pa., has now reached total of 4,700. Considering the improvements in machinery which have been made in the last few years this is the largest number of men ever employed at the Steelton works. The men are now receiving the scale of wages paid before the reduction about two years ago.

The Phœnix Iron Company, of Philadelphia, Pa., is contemplating the erection of a large blast furnace, and estimates are about to be asked from builders.

The new stock of the Cambria Iron Co. was all subscribed by the stockholders under the terms announced by the Directors. The new issue is 40,000 shares, and with this new stock the capital of the company is $7,000,000. It is said that the company may shortly declare a stock dividend of 2½ per cent. on the increased capital stock, making the capital $7,875,000.

The Michigan Malleable Iron Works, Detroit, will increase the wages of employees 10 per cent. on Aug 1.

New Stations and Shops.

The Carlisle (La.) Manufacturing Company has asked for bids for the erection of an addition to the car shops, 60 ft. long and 70 ft. wide. It will be built at the southern end of the machine shops.

The Chicago Great Western has begun work on the foundations for new repair shops at Oelwein, Ia. The main shop is to be 90 ft. wide and 700 ft. long.

The Atchison, Topeka & Santa Fe, it is said, is to build new shops and roundhouse at Arkansas City, Kan., which when finally completed will employ about 300 men. The preliminary work preparatory to the erection of the shops is now proceeding rapidly.

A second meeting of the promoters of the new Union station project at Fort Worth, Tex., was held last week, and at this meeting representatives of practically all the railroads entering Fort Worth were present. The railroad officers do not appear to have committed themselves to the project, but the outlook for the erection of the Union station building as proposed seems to be very favorable. It is stated that the Gulf, Colorado & Santa Fe has agreed to subscribe $20,000 to the company organized to build the new station, and is willing to double that subscription if it is necessary. The plans now discussed are for a station to cost at least $250,000, but more definite plans will be formulated at a meeting to be held July 20. The Chicago, Rock Island & Texas, the Texas & Pacific, the Gulf, Colorado & Santa Fe, the Fort Worth & Denver City and the Fort Worth & Rio Grande have all been represented at the meetings so far held to discuss the project. The present idea is to organize a company whose directors will include the business men of the city as well as railroad officers. Mayor Paddock, of Fort Worth, is Secretary of the temporary organization.

A recent decision of the Georgia Supreme Court in favor of the East Tennessee, Virginia & Georgia road, in a suit against that company respecting certain real estate located near the existing shops in Atlanta, will enable the Southern Railway to proceed at once with the enlargement of the shops, which has been proposed since the East Tennessee, Virginia & Georgia was transferred to that company. When the new buildings are ready the capacity of the present shops will be doubled. New machinery will be added to enable the company to build new equipment at these shops when desirable.

The new shop buildings of the Southern Railway at Knoxville, Tenn., are now practically completed and will be in full running order by Aug 1. These shops will employ about 800 hands when running on full time, and will have the general repair work of the Western lines.

The new machine shops of the Houston, East & West Texas at Houston, Tex., will be ready for operation about Sept. 1 next. The buildings will be well equipped with modern machinery. The new shops comprise a machine shop, 50 × 208 ft., a blacksmith shop, 40 × 60 ft. and a boiler shop, 40 × 60 ft. All of these buildings will be one-story frame structures, with roofs of galvanized corrugated iron.

The North River Bridge.

One of the Philadelphia papers has recently published an interview with Mr. Robert H. Sayre, Second Vice-President of the Lehigh Valley Railroad, concerning the North River bridge. He expresses the opinion that the lower location, that is, the location of the North River Bridge Company, is preferable to that of the New York & New Jersey Company. This is chiefly because it would command a large local traffic, and Mr. Sayre suggests that electric cars should be run over the bridge into New York. Indeed, he estimates that the revenue from this sort of traffic would be much greater than that from railroads. He very justly says that the present system of distribution of freight is so cheap and efficient that no bridge could do it better, a fact which we have long held to be beyond dispute. He says that the principal revenue of the bridge must come from local and suburban passenger business and that this is a kind of business which can bear but very little additional charge. Indeed, we should say that the suburban passenger business would bear no additional charge; furthermore, it is better distributed now by ferryboats than it can be by a bridge, even on the lower site, leaving the railroad revenue of the bridge to come from the small amount of freight which could profitably be delivered in the city and from through passengers, and from a small percentage of the local and suburban business. Mr. Sayre says that no bridge would pay from the railroad traffic alone, in which he is probably quite right.

The Folsom Power at Sacramento.

The electric current was turned on in San Francisco on Monday of this week from the generating plant at Folsom, 24 miles away. It was utilized at once for running the street cars, and is also to be used for lighting and probably for small power purposes.

The Puget Sound-Lake Washington Canal.

The Bowers Dredging Company, of Chicago, Ill., have a contract to excavate 9,000,000 yds. of the proposed canal at Seattle connecting Puget Sound with Lake Washington. The contract price per cubic yard is 16 cents. This canal is to be across a narrow neck of land three miles wide, and will give Seattle a fresh water harbor in Lake Washington, which is east of the city. The earth excavated from this will be used in filling in the tidewater flats south of the city, which will then be utilized for docks and railroad facilities. An account of the proposed improvements on the tidewater flats will be found in the *Railroad Gazette* of March 29, 1895.

The Arc Light and the Sun.

Mr. A. Dolbear, in the July *Cosmopolitan*, makes some interesting calculations concerning the sun and its energy. On the earth's surface we receive about one-third of a horse-power per square foot, although the sun radiates 10,000 H. P. per square foot at its surface. An arc light having a bright surface of 1 sq. ft. would radiate 8,640 H. P., which is nearly that observed from the sun per square foot. From these facts it seems that the temperature of the sun does not necessarily exceed greatly that in an electric arc, or about 6,300 deg.

The Armor Contracts.

The great contracts with the Bethlehem and Carnegie companies for 12,000 tons of armor are now practically completed. A good deal of heavy forging is yet to be done, and it is expected that appropriations will be made by the next Congress for further large armor contracts.

Purchase of the Johnson Railroad Signal Co.

The property of the Johnson Railroad Signal Co., of Rahway, N. J., including real estate, buildings, machinery, materials, patents and good-will, has been sold by the Chancellor to the National Switch and Signal Co., of Easton, Pa., for $52,500.

The acquisition of this property not only materially increases the capacity of the National Co., but gives it a broader range of work, for with the purchase of the several patents of the Johnson Co. it can enter the entire field of the art, and can furnish both types of interlocking machines, as well as the Webb & Thompson staff, the Patenall lock and block, and other valuable devices which are well known among railroad men. The progress made by the National Company since its reorganization has been important. The first step of the new management was to commence the erection of new buildings on its property in Easton, and at the same time the Superintendent of Works was directed to prepare a complete set of jigs and dies for all apparatus and to make all parts interchangeable before further orders were filled. By September the company was installed in its new works with new special machinery, and since that time, in spite of the general depression in business, the demand for its product has increased steadily until it was necessary to operate double shifts during the last three months. Additional machinery was put in, and now, with the works secured by the purchase of the Johnson Company, this concern has become one of the largest in its line in the country. The works at Rahway began operations July 15. Mr. Aaron Dean, Jr., has been appointed Eastern Agent, with office at 32 Liberty street, N. Y., and Mr. T. H. Patenall, of Rahway, has been appointed Chief Electrician and will take charge of the works at Rahway.

THE SCRAP HEAP.

Notes.

On July 13 the Empire State express ran from Syracuse to Albany, 149 miles, in 149 minutes, including a stop of 8 minutes at Utica.

The Chicago & Eastern Illinois announces that the 10 per cent. taken off in 1893 from the salaries of employees receiving over $50 a month will be restored.

The Michigan Central and the Union Stock Yards Company have withdrawn their suits against the City of Chicago for damages sustained during the strike of 1894.

The Pennsylvania Co. has issued a rule forbidding the use of freight cars not complying with the federal law concerning grabirons and the height of drawbars.

The East Lake Line of the Birmingham (Ala.) Railway & Electric Co., which is now operated by "dummy" steam locomotives, is to be equipped for electric trolley cars.

A press dispatch of July 15 reported that three railroad bridges had been destroyed by the insurgents in Cuba. They were on the line between Nuevitas and Puerto Principe.

A despatch from Buenos Ayres, July 11, reports a collision between two immigrant trains at San Pablo, Province of Corrientos, in which 18 persons were killed and 30 injured.

The street cars to be run by compressed air, which are to be tried in Baltimore, are about finished. A car propelled by compressed air is to be tried on the Ninth Avenue Line of the Metropolitan Traction Co., New York City.

The Pittsburgh, Cincinnati, Chicago & St. Louis is tearing down coal sheds and grading grounds near Fourth avenue, Pittsburgh, for the purpose of making a new freight delivery yard. The yard will have room for 150 cars of bulk freight.

The Tennessee Coal, Iron & Railway Co. has made a 10 per cent. increase in the wages of 1,500 mine helpers at Birmingham. The ore handlers on the docks at Cleveland, O., have had their wages raised 10 per cent., the price of unloading ore from boats being at the same time raised from 13½ cents to 15 cents a ton.

Forty feet of the Atlantic & Pacific bridge, 20 miles west of Albuquerque, N M., were swept away by a flood last week. The Southern Pacific was badly washed out between El Paso and Deming. On the Atchison, Topeka & Santa Fe nine bridges and a mile of track were washed out between Rincon and Deming. The Silver City branch was greatly damaged by washouts.

Street railroad mail cars are now running in Philadelphia between Chestnut Hill and Passyunk eight times a day each way. The postmaster has issued a time-table showing the time at which the cars pass nine designated intermediate points, and residents along the route are invited to drop letters in the cars as they pass, thus saving from two to four hours over the time required for delivery of city letters when they are deposited in the street boxes.

A freight train of the Philadelphia, Wilmington & Baltimore was attacked by 50 tramps at Bayview Junction, near Baltimore, on the night of July 9, and the trainmen had to cut off their engine and flee to Canton for help. They secured a force of policemen and went back; they found the tramps in the woods, which were enveloped in complete darkness, but they succeeded in capturing 16. The reports indicate that the gang was composed of desperadoes, who richly deserve severe punishment, but it was impossible to prove anything against them worse than trespassing, and they were imprisoned for only 10 days.

The Philadelphia, Newtown Square & Westchester Street Railroad was opened for business on July 11 with small steam locomotives, eight "dummies" having been secured. This is the line which had a legal difficulty at a crossing with a line of the Pennsylvania Railroad wherein it was found that the charter gave the street line all the rights it wanted except the right to use electric motive power. The legal controversy is still unsettled and it is expected that the use of the steam engines, which are likely to scare horses more than trolley cars would, will influence public opinion in favor of the demand of the company to put in electric apparatus.

Lake Notes.

The commerce of the Sault Ste. Marie canal for the season shows the heaviest business to July 1 on record. There have been passed 2,540,700 net tons of iron ore, 6,256,000 bushels of wheat, 224 million ft. of lumber, 2,682,000 barrels of flour and 311,000 tons of coal beside other commodities. With the great business in ore it is expected that July will go far ahead of any month in the canal's history.

The steamer that is to carry freight from the lake ports to New York without breaking bulk, will have for its first cargo 1,500 tons of street railroad rails from the Lorain works of the Johnson company to New York City.

The *Marine Review* reports the shipments of iron ore from lake ports for the first six months of this year as 3,142,756 gross tons, which is 637,345 tons more than for the first half of 1894. Docks at Lake Erie ports are now crowded, and shippers evidently intend to move their product as early as possible, to avoid the chance of having to pay higher freight rates later in the season.

The Engineer of the New East River Bridge.

After a meeting of the Commissioners on the new East River Bridge, New York, held last Tuesday, one of the Commissioners stated that three candidates for the position of Chief Engineer had been consulted with and that five more applications remain to be considered. He said that the choice of Chief Engineer would not be made until after July 24.

Accident in a Caisson.

Press reports from Alexandria, Egypt, say that a caisson, which was being used in laying the foundations of a large bridge at Nassel-Hama, sank on July 9, carrying down 40 workmen, all of whom were drowned. The bridge is being built by a French firm.

Improvements on the Pennsylvania.

The Pennsylvania Railroad Company is to use the proceeds of the loan for $5,000,000, recently placed in London at 3½ per cent., entirely for betterments. The story is that this sum will be divided about equally between the lines east and west of Pittsburgh. On the eastern system there is, as every one knows, a big bridge building across the Delaware River, which will take a very large percentage of the quota assigned to this part of the system. There will, however, be considerable expenditure on third and fourth track and on the work of the separation of grades at crossings.

West of Pittsburgh the most important work is the rebuilding of the bridge at Cincinnati, a description of which we shall shortly publish. Some change of grade and alignment is to be made on the Cleveland & Marietta Railroad, and the company will spend considerable money on the new station at Dayton and on grade crossings in Columbus. On the Pan Handle line two tunnels are, it is said, to be widened.

The Oakland Water Front.

Judge Ogden, in the Superior Court at Oakland, Cal., July 16, rendered a decision in the famous case of the City of Oakland vs. The Water Front Company (the Southern Pacific Company), involving the title of 11 miles of water front, valued at many millions of dollars, and which has been practically in dispute for 40 years. He decides in favor of the city, but he does not disturb the title of third parties now holding small portions, bought in good faith from the Water Front Company and improved.

LOCOMOTIVE BUILDING.

The Lake Shore & Michigan Southern is in the market for 30 ten-wheel engines.

The Pittsburgh, Akron & Western has awarded a contract to the Brooks Locomotive Works for building four locomotives.

Among the engines now in course of construction at the Altoona shops of the Pennsylvania are two 2-cylinder compounds. It is said that about 75 engines will be built at Altoona as fast as possible with the present force.

The Rogers Locomotive Co. has received an order from the West India Improvement Co. for building six 10-wheel engines weighing about 65 tons each for shipment to Jamaica, West Indies. They will be used for both freight and passenger service on the Jamaica Railway. It is expected that these engines will be delivered in October.

The remarkable departure in design of fast locomotives made by the Reading in introducing a single driver engine for the Royal Blue line and similar work is now in actual test. A Baldwin compound with one pair of drivers and 42 in. trailers has been running more or less between Bound Brook and Philadelphia since early this month and is credited with high speeds About 10 days ago the engine was put in regular service. The drivers are 84 in. in diameter.

The Baldwin Locomotive Works, Philadelphia, are building four compound locomotives for the State railroads of Chile; two 10-wheel engines with 56-in. driving wheels, and two passenger engines with 66-in. driving wheels. These engines will weigh in working order about 123,000 lbs. each. They have six-wheel tenders similar to those heretofore constructed in the United States for these lines, and generally similar to European tenders. In addition to the above the Baldwin Works are building ten 18 × 24-in. cylinder eight-wheel passenger locomotives for the Missouri Pacific, and five consolidation freight locomotives for the Buffalo & Susquehanna. Among the latter is one consolidation locomotive weighing about 75 tons, with cylinders 22 in. × 26 in., and carrying a working steam pressure of 200 lbs. per square inch. The works have several other small orders from foreign countries, and parts of the establishment are now running nights. The works are building three engines which will go to the Atlanta Exposition. One of them is of the Columbia type for the Atlantic Coast Line, and another is a switching engine for the Central of Georgia. The third will be exhibited by the firm.

CAR BUILDING.

The car shops of Murray, Dougall & Co., Milton, Pa., which have long been closed, will be started early in August, the company having taken an order for 250 coal cars for the Beech Creek Railroad.

The contracts for building 1,000 hopper bottom gondola cars for the Beech Creek Railroad, referred to in our last issue, have been let as follows: Buffalo Car Works, Buffalo, 250; Murray, Dougal & Co., Milton, Pa., 250, and Union Car Works, Depew, N. Y., 500.

The West India Improvement Company has ordered from the Jackson & Sharp Co., Wilmington, Del., two passenger cars for shipment to the Jamaica Railway, West Indies. This same company will also award a contract for the building of 40 flat cars some time this week.

The Railway Cycle Mfg. Co., at Hagerstown, Ind., has been very successful in the introduction of its inspection car, although it was only brought out this year. Many orders have been received for it, and the officers of the company say that wherever used it has given great satisfaction.

The Madison Car Co.'s shops, at Madison, Ill., are very busy in all departments. Among recent orders was one for 52 flat cars, 40 ft. long, for the Queen & Crescent. These shops have just completed 100 standard 32-ft. box cars for the Union Pacific, Denver & Gulf, equipped with Westinghouse air brakes, the Winslow car roof and McCue grain doors.

The Wheeling & Lake Erie is now building at its shops at Ironville, O., 150 gondola cars of 30 tons capacity. Most of these cars, inside dimensions, will be 34 ft. 3 in. × 8 ft. 4 in., and 36 in. deep. They are equipped with M. C. B. couplers and have a number of novel points about their design, particulars of which were given in this column in our issue of June 14.

The Northern Pacific has given an order to the shops at Edison, Wash., near Tacoma, for building 100 box cars, 38 ft. long of 60,000 lbs. capacity. The cars are to be completed by Sept. 1. The wheels will be made by the American Foundry Co., of Edison, Wash. Since the Edison shops were built about 600 cars have been built there, including 200 Street stable cars, 100 logging cars, 100 platform cars and 200 gondola, box and other cars. At present about 300 men are working in the shops, and this number will be largely increased.

BRIDGE BUILDING.

Albany, N. Y.—Bids have been received for constructing the Northern Boulevard viaduct as follows: Boston Bridge Works, $61,717; Wrought Iron Bridge Co., Canton, O., $62,471; Hilton Bridge Co., of Albany, $56,748. The Detroit Bridge Co. submitted a bid which was declared informal, as well as a design for a stone arch to cost $58,000.

Allenwood, Pa.—Proposals have been invited for the construction of the new iron bridge from this point to Dewart. It will be built jointly by Northumberland and Union Counties and will cost in the neighborhood of $25,000. It will be 12 ft. longer than the bridge at Muncy.

Buffalo, N. Y.—Bids were opened at Albany, N. Y., July 1, for building the superstructure and substructure for a bridge over the Erie Canal, at Mill street, Buffalo. The Hilton Bridge Co., of Albany, put in the only bid, and the contract was awarded to that firm at $6,944.

Carlisle, Pa.—The County Commissioners have decided to erect a steel bridge 191 ft. long over the Conodoguinet Creek at Wolf's Fording in Middlesex Township, and have awarded the contract to Nelson & Buchanan, Chambersburg, Pa., at their bid of $6,149, with $300 for the fill.

Defiance, O.—Bids are desired July 23 for constructing the masonry work for a steel bridge over the Tiffin River, near Evansport. Address J. F. Van Behren, Auditor of Williams County.

Easton, Pa.—The County Commissioners have decided to advertise for bids to erect a county bridge at Uhlertown to replace one at present unsafe.

Elmira, N. Y.—The specifications for the two new bridges to be erected across the Chemung River at a cost of about $115,000 have been completed and bids advertised for.

The Erie railroad bridge, built by the Elmira Bridge Company, has been completed. The bridge is built of steel in four spans.

Greenwood, Pa.—The new Second Avenue Traction Company's bridge at this point was thrown open to the public July 13. It is of steel and was built by the Penn Bridge Company. The structure is 2,730 ft. long.

Harrisburg, Pa.—The County Commissioners have opened bids for the stone work on the new bridge across Powell's Creek, at Sponsler's Mill, in Wayne Township, the lowest being $344.47. Bids were also opened for the iron work on the Sponsler and Loudermilch bridges. The lowest bids were $898 and $1,041 respectively.

Hawkesbury, Que.—The Great Northern Railway Company has been informed that the Railway Committee of the Privy Council, Ottawa, Ont., has approved of the plans of its bridge at this place.

Ironton, O.—A highway bridge is to be built, 210 ft. long, of iron and steel, over Storm's Creek, at Elm street. Bids will be received until Aug. 1 by J. R. C. Brown, City Engineer.

Jefferson, Wis.—It was voted on July 3 to appropriate $2,000 for a new bridge across the Lock River at Main street.

Hennepin, Ill.—The Illinois River Bridge Co., with a capital stock of $2,500, was incorporated at the office of the Secretary of State, Springfield, Ill., last week, to build a bridge across the Illinois River at Hennepin. W. F. Evans is one of the incorporators.

Mamaroneck, N. Y.—The contract for the stone arch bridge over the Mamaroneck River between Rye and Mamaroneck has been awarded to Dean & Westbrook, of New York, the contract price being $13,475. The work is to be finished in three months.

Niagara Falls.—Some months ago Mr. L. L. Buck made complete plans for a bridge to be built across Niagara River, just below the falls, to replace the upper suspension bridge, now a highway and foot bridge. The new bridge would be constructed to carry a trolley road as well as the highway. After thorough consideration of all the conditions Mr. Buck decided that the new bridge should be a steel arch of 840 ft. span, and his plans are for such a structure. It is now said that the company proposes to go ahead immediately with the foundations, although we believe that even this is not definitely decided upon as yet, and certainly no definite decision has been reached as to when the superstructure will be begun.

Northern Pacific Railroad.—This company will replace the timber trestles over Austin and Greenhorn Gulches with steel viaducts, the contracts for which have been awarded to the Pittsburgh Bridge Co., J. A. Nichols, Chief Engineer. The Austin Gulch viaduct will be on a grade of 85 ft. to the mile and a 10 deg. curve. The six tower spans will be 31 ft. and the intermediate spans will be from 30 to 57 ft. long—total length, 493 ft.; total weight, 683,000 lbs. The Greenhorn Gulch viaduct has the same grade and curvature, seven tower bents and eight intermediate spans—total length of 579 ft., and estimated weight of 769,000 lbs.

Philadelphia, Pa.—The Philadelphia, Newton & New York Railroad has prepared plans for a new stone bridge of two arches over Tacony Creek.

Pittsburgh, Pa.—The entrance to Schenley Park will be improved by the construction of two bridges. The first will be a stone arch of 150 ft. span of massive cut stone; the other, a steel and stone viaduct, will be in the rear of the new Carnegie Library building, and will span the Pittsburgh Junction Railway. It will be about 550 ft. long. Both will have wide foot and carriage ways. Bids will be asked for this work in a few weeks.

Edward M. Biglow, Director of the Department of Public Works, will receive bids until July 27 for the construction of a steel viaduct over Panther Hollow in Schenley Park. It will be 620 ft. long, 115 ft high and have an arch of 360-ft. span. The roadway is to be 40 ft. wide and the two sidewalks 10 ft. The bridge is estimated to cost $125,000.

The contract for building the foundations of the new Nineteenth street bridge over the Monongahela has been awarded to The Drake & Stratton Co. The bridge is the property of the Birmingham & Pittsburgh Bridge Co. The new structure will be of steel with spans of 500, 320,

250 and 200 ft. The Keystone Bridge Works will build the superstructure.

Plymouth, Wis.—The City Council has adopted plans for a Melan arch, and at the same time has resolved that the royalty be paid by the city, so that bids will be open to all contractors.

Rankin, Pa.—The Munhall & Rankin Bridge Co. has been formed for the purpose of constructing a highway bridge over the Monongahela River between the two points named.

Rock Island, Ill.—The bids for the abutments and piers of the proposed bridge over the Mississippi River between Davenport, Ia., and Rock Island will be received until August 12 by the United States engineers at Rock Island Arsenal, Rock Island. Some mention of this bridge was made last week. It will have eight spans, including the draw span and two elevated shore spans. The bids for the structure may be made on the government plans, or with suggested modifications by the bidding companies, or the bidder may prepare plans

San Francisco, Cal.—The Pittsburgh Bridge Co., Pittsburgh, Pa., through Healy, Tibetts & Co., of San Francisco, have secured the contract for a single-track drawbridge, 180 ft. long, for the San Francisco & San Joaquin Valley Railroad.

Scranton, Pa.—Bids for constructing the approaches to the Spruce street bridge have been received and referred to committee. The lowest bid was $13,400.

Turtle Creek, Pa.—The borough of Turtle Creek, Allegheny County, will build a bridge over the creek at that place.

Westchester, Pa.—The County Commissioners have decided to build a new bridge over Chester Creek, in West-town Township. The new structure will be of iron with a 40-ft. span. It will replace a wooden bridge.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Boston & Maine, quarterly, 1½ per cent., payable Aug. 15.

Connecticut & Passumpsic Rivers, 2½ per cent., payable Aug. 1.

Cornwall & Lebanon, semi-annual, 2 per cent.

Long Island, quarterly, 1 per cent. upon the capital stock, payable Aug. 1.

Schuylkill Valley, 2½ per cent., payable July 12.

Toledo & Ohio Central, quarterly, ¼ per cent. on the preferred stock, payable July 25.

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Rutland, annual, July 25.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The Engineers' and Architects' Association of Southern California meets each third Wednesday of the month in the Hall of the Chamber of Commerce, Los Angeles, Cal.

The Engineers' Society of Western New York holds regular meetings the first Monday in each month, except in the months of July and August, at the Buffalo Library Building.

The *Western Railway Club* meets in Chicago on the third Tuesday of each month, at 2 p. m.

The *New York Railroad Club* meets at the rooms of the American Society of Mechanical Engineers, 12 West Thirty-first street, New York City, on the third Thursday in each month, at 8 p. m.

The *New England Railroad Club* meets at Wesleyan Hall, Bromfield street, Boston, Mass., on the second Wednesday of each month.

The *Central Railway Club* meets at the Hotel Iroquois Buffalo, N. Y., on the second Friday of January, March, May, September and November, at 2 p. m.

The *Southern and Southwestern Railway Club* meets at the Kimball House, Atlanta, Ga., on the third Thursday in January, April, August and November.

The *Northwestern Railroad Club* meets at the Ryan Hotel, St. Paul, on the second Tuesday of each month, at 8 p. m.

The *Northwestern Track and Bridge Association* meets at the St. Paul Union Station on the Friday following the second Wednesday of March, June, September and December, at 2.30 p. m.

The *American Society of Civil Engineers* meets at the House of the Society, 127 East Twenty-third street New York, on the first and third Wednesdays in each month, at 8 p. m.

The *Western Society of Engineers* meets on the first Tuesday in each month, at 8 p. m. The headquarters of the society are at 1736-1739 Monadnock Block, Chicago. The business meetings are held on the first Wednesday at its rooms. The meetings for the reading and discussion of papers are held on the third Wednesday at the Armour Institute, Thirty-third street and Armour avenue.

The *Engineers' Club of Philadelphia* meets at the House of the Club, 1122 Girard street, Philadelphia, on the first and third Saturdays of each month, at 8 p. m.

The *Boston Society of Civil Engineers* meets at Wesleyan Hall, 36 Bromfield street, Boston, on the third Wednesday in each month, at 7.30 p. m.

The *Engineers' Club of St. Louis* meets in the Missouri Historical Society Building, corner Sixteenth street and Lucas place, St. Louis, on the first and third Wednesdays in each month.

The *Engineering Association of the South* meets on the second Thursday in each month, at 8 p. m. The Association headquarters are at The Cumberland Publishing House, Nashville, Tenn.

The *Engineers' Society of Western Pennsylvania* meets in the Carnegie Library Building, Allegheny, Pa., on the third Tuesday in each month, at 7.30 p. m.

The *Technical Society of the Pacific Coast* meets at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., on the first Friday in each month, at 8 p. m.

The *Association of Engineers of Virginia* holds informal meetings on the third Wednesday of each month, from September to May, inclusive, at 710 Terry Building, Roanoke, at 8 p. m.

The *Denver Society of Civil Engineers* meets at 36 Jacobson Block, Denver, Col., on the second and fourth Tuesdays of each month except during July, August and December, when they are held on the second Tuesday only.

The *Canadian Society of Civil Engineers* meets at its rooms, 112 Mansfield street, Montreal, P. Q., every alternate Thursday, at 8 p. m.

The *Civil Engineers' Club of Cleveland* meets in the Case Library Building, Cleveland, O., on the second Tuesday in each month, at 8 p. m. Semi-monthly meetings are held on the fourth Tuesday of each month.

The *Engineers' Club of Cincinnati* meets at the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati, O., on the third Thursday in each month, at 7.30 p. m. Address P. O. Box 333.

The *Engineers' and Architects' Club of Louisville* meets in the Norton Building, Fourth avenue and Jefferson street, on the second Thursday each month at 8 p. m.

The *Western Foundrymen's Association* meets in the Great Northern Hotel, Chicago, on the third Wednesday of each month. B. W. Gardner, Monadnock Block, Chicago, is secretary of the association.

The *Association of Civil Engineers of Cornell University* meets on Friday of each week at 2:30 p. m., from October to May, inclusive, at its association rooms in Lincoln Hall, Ithaca, N. Y.

The Civil Engineers' Club of Cleveland.

The regular meeting of the Civil Engineers' Club of Cleveland was held in the rooms of the Club, Case Library Building, Tuesday, July 9, 1895.

Mr. Thompson, Chairman of the Committee on Resolutions upon the death of Mr. M. A. Wellington, submitted a report in memory of Mr. Wellington and his services to technical literature. It was resolved that these resolutions be spread upon the minutes of the club and a copy be forwarded to his family.

The club then listened to the paper of the evening by Mr. Wm. H. Searles, entitled "The Deflections and Stresses of a Flexible Ring under Load," which was very interesting.

Mr. Robert Hoffman was elected to active membership.

Central Association of Railroad Officers.

This association, composed chiefly of general and division superintendents, and having branches in Cincinnati, Columbus, Toledo, Indianapolis, Louisville, St. Louis and Peoria, held its annual meeting at St. Clair, Mich., on July 8. The following officers were elected for the ensuing year: President, C. A. Davies, of Louisville; First Vice-President, C. A. Wilson, of Toledo; Second Vice-president, George L. Jarvis, of Indianapolis, who with W. A. Garrett, of St. Louis; J. M. Graham, of Columbus; Ralph Peters, of Cincinnati, and Benjamin Kean, of Terre Haute, constitute the executive committee. O. G. Fetter, of Cincinnati, was re-elected Secretary and Treasurer.

The visit to St. Clair was largely in the nature of a pleasure excursion, but a number of papers were read, among which were one by Mr. J. J. Turner on Yard Work, and one by Mr. M. W. Mansfield on Train Loading, both of which appeared in the *Railroad Gazette* of July 12.

Engineers' Society of Western New York.

This society met in regular monthly meeting at its rooms in the Buffalo Library Building, President George E. Mann in the chair. The subject for the evening was "Mechanical Draft" by Mr. Henry B. Prather. The principal advantages of mechanical draft are the more effectual combustion of fuel; the obviation of the necessity for high chimneys; the possibility of the use of a cheaper grade of coal, and the abolition of the smoke nuisance. It has been urged that the use of the more rapid draft causes early deterioration of the grates. It can be shown that this is not the case with properly designed apparatus. The value of the use of even cold "forced draft" and still more of the forced or exhaust draft with air or feed water heating economizer attachments in effecting an economy of from 8 to 25 per cent. over natural draft, and the practical elimination of the smoke nuisance, is well established.

The first cost of a properly-designed mechanical draft plant is very much less than that of a suitable chimney for natural draft of equal capacity, usually averaging 75 to 80 per cent. less, and as to power required for running the fan in a plant with 6,000-H. P. boilers the power required to drive one fan to do this work, estimated in coal at $3 per ton, would cost for running the plant one year not over 2 per cent. of the estimated cost of a natural-draft chimney for the plant. In other words, it would not pay to build a chimney so long as money was worth more than 2 per cent per annum.

Mechanical draft possesses great advantages over natural draft in its adaptability to both large and small capacities and in its ability to meet sudden and excessive demands for steam.

The "fuel economizer and smoke consumer," a form of mechanical draft, in which some of the gases from the chimney and ordinary air are mixed and discharged under the grates of the boiler, was mentioned. Tests of this apparatus under the direction of the Smoke Commission of the city of St. Louis, Mo., showed a gain in efficiency over the same boilers, without the device, of 36 per cent. and a practical abolition of the smoke nuisance. A plant like this, with a fan and engine and all the necessary apparatus, was installed in the power and light room of the large dry-goods store of Barnes, Hengerer & Co., of Buffalo, about two years ago, and has run successfully ever since with no unusual repairs, and has shown a net saving of nearly 50 per cent. in the fuel bills, with a practical abolition of the smoke nuisance. The remarkable economy and difference in the fuel bills arises from the fact that before the introduction of this system the best pea coal and anthracite was burned, while with the use of the forced draft apparatus a soft coal slack is used with the addition of one barrel of good hard coal to about six or eight of the slack or cheap coal.

Plants have been installed in the Genesee and Broezel hotels, in about twenty fact ries and manufacturing establishments in Buffalo and neighborhood, and on the lake steamers Wm. H. Gratwick, Caledonia, Italia, Bulgaria, Australasia and others, with practically the same results.

PERSONAL.

—Mr. W. W. Richardson has been appointed Traveling Passenger Agent for the Pennsylvania lines, with headquarters at Omaha, Neb., vice Mr. G. B. Teedrick, transferred.

—Mr. W. I. Midler, Assistant General Ticket Agent of the Pullman Palace Car Co., has been appointed to fill the place left vacant by the death of General Ticket Agent Gray.

—Mr. Alfred Kellond has been appointed Assistant General Passenger Agent of the Illinois Central at New Orleans, succeeding Mr. F. B. Bowes, who is now General Freight Agent of the Southern lines of that Company.

—Mr. J. J. R. Croes has been appointed Consulting Engineer to the Bronx Valley Sewer & Highway Commission, created by the New York law of 1895, to inquire into the expediency of constructing a sewer and highway through the Counties of New York and Westchester along the Bronx River.

—Mr. W. W. Ansley, Division Roadmaster of the Alabama Midland, has been promoted to the position of General Roadmaster of the Plant Lines, with headquarters at Waycross, Ga. The appointment is made by General Superintendent Dunham, who for some years was General Superintendent of the Alabama Midland.

—Hon. Joseph B. Stearns, who invented the Duplex telegraph apparatus, died at his home at Camden, Me., recently, at an advanced age. He was well-known to all old telegraphers, and for a long time was President of the Franklin Telegraph Co., which operated a telegraph line from Boston to Washington.

—Mr. J. C. Hoover, who has been Treasurer and Purchasing Agent of the Columbus, Sandusky & Hocking road, has recently resigned those positions. Both positions have been abolished by the receiver, the duties of Treasurer devolving upon the cashier and those of the Purchasing Agent being assumed by General Superintendent Thornburg.

—Mr. Jeffery, President of the Denver & Rio Grande and Vice-President Thomson, of the Pennsylvania, arrived home from Europe last Saturday. Concerning other American delegates to the International Railroad Congress a press dispatch says: Messrs. Haines, Allen and Bradley are making a tour of Scotland; Messrs. Harahan and Kenly are in Ireland; Mr. Walters is in Germany, and Mr. Frey has gone to Amsterdam.

—Mr. Louis Edward Asser, Engineer, and formerly Chief of Way and Works of the Netherlands Railroads, died on June 30. He was Secretary of the Sixth International Congress on International Navigation held at The Hague last year. All Americans who were at The Hague will read this announcement with sorrow. He was able and efficient as a secretary and unremitting in his consideration for those who attended the Congress.

—Sir Charles Rivers Wilson, the new President of the Grand Trunk road, it is now announced will visit this country to inspect the line of the Grand Trunk road during August. He expects to arrive in Montreal on Aug. 17 and will be followed soon after by Vice-President Joseph Rice and others of the newly elected directors. The party will then make a tour of the line and expect to be engaged six weeks on this inspection trip.

—Mr. Jesse M. Smith has been recently appointed Auditor of the Interstate Commerce Commission at Washington, succeeding Mr. C. C. McCain who resigned that position over a month ago to become Commissioner of the Lake Traffic Association at Buffalo. Mr. Smith has been Assistant Auditor of the Commission for over seven years, or since that office was created, and with a thorough knowledge of the routine of the office, is well qualified for the duties of Auditor.

—Mr. George Whaley, of Paris, France, has been elected Vice-President and General Manager of the Panama Railroad, and will enter upon the duties of the office at once. Mr. Whaley has for several years been the Chief Mechanical Engineer of the Western Railroad of France, and is well known to American railroad men who visited the Paris Exposition of 1889, and at that time were the recipients of numerous courtesies from him. Mr Whaley visited this country about three months ago.

—Mr. D. T. Forbes, Superintendent of the San Antonio division of the Southern Pacific, has been appointed General Superintendent of the New York, Texas & Mexican and Gulf, Western Texas & Pacific companies in Texas, which comprise the Victoria branch of the Southern Pacific, vice Mr. W. S. Hoskins. Mr. Forbes entered the service of the Southern Pacific as a telegraph operator several years ago, became train dispatcher of the Houston division, and was then promoted to be Division Superintendent.

—Mr. Everett A. Stevens, one of the Railroad Commissioners of Massachusetts for the last 12 years, died at Norridgewock, Me., on Saturday last, at the age of 52. Mr. Stevens served through the war of the Rebellion in the Eleventh Massachusetts Regiment and afterward became a locomotive engineer on the Fitchburg Railroad. He was first appointed Commissioner by Governor Butler on the recommendation of the representatives of the "labor vote." He had been in poor health for a long time. Mr. Stevens was a man of good judgment and was always spoken of by his brother commissioners as a valuable man on the Board.

—Mr. George De Haven, General Passenger Agent of the Chicago & West Michigan and the Detroit, Lansing & Northern, has resigned that position and is to become managing editor of the *Chicago Mail*. Mr. De Haven has been in the railroad service nearly 20 years, having been with the Pennsylvania from 1876 to 1887, holding various positions in the passenger department. In the latter year he became Assistant General Passenger Agent of the Erie, where he stayed five years. He then went to the position which he has just left. Mr. De Haven is one of the best known passenger men of the country, and has shown peculiar ability in the advertising department.

— Last May Mr. Octave Chanute, C. E., past President of the American Society of Civil Engineers, was elected an honorary member of the Institution of Civil Engineers (England). The honorary list of the Institution includes only 19 names. Among these are those of Sir Frederick Abel, Sir Henry Bessemer, Sir Douglas Galton, Sir William Grove, better known as Dr. Grove, Lord Kelvin and Henri Schneider, of Le Cresot. To these names is now added that of Mr. Chanute. In this list are given the names of those who have won distinction by their achievements. Other honorary members are the King of Belgium, the Prince of Wales, the Dukes of Cambridge, Connaught, Devonshire and York, and the Marquis of Salisbury.

—Mr. Albion Nelson Towne, Second Vice-President and General Manager of the Southern Pacific Co., died in San Francisco last Tuesday morning. Mr. Towne was just past 66, having been born May 26, 1829, in Charlton, Mass. Nearly 26 years ago he went to the Central Pacific and has been ever since in the service of that system of railroads. He began his railroad career in 1855 as a freight brakeman on the Chicago, Burlington & Quincy and went up through the various grades of the transportation department until he became Assistant Superintendent of that railroad. Afterward he was General Superintendent of the Chicago & Great Eastern and for one year Assistant General Superintendent of the Chicago, Burlington & Quincy. The rest of his life was spent in the service in which he died.

ELECTIONS AND APPOINTMENTS.

Marshall North & South.—The principal incorporators of this company, which, as announced in our last issue, has been chartered to build a railroad from Marshall to Center, Tex., are William M. Johnson, H. B. Patts and M. Scully.

Seaboard Air Line.—C. R. Capps has been appointed General Freight Agent, to take the place of Mr. Glover, who is now Traffic Manager. Mr. Capps has hitherto been the Chief Clerk of the Freight Department. His office is at Portsmouth, Va.

Southern Pacific.—D. T. Forbes has been appointed General Superintendent of the New York, Texas & Mexico and the Gulf, Western Texas & Pacific divisions, vice W. S. Hoskins, resigned.

West Virginia Southern.—The incorporators named in the charter, recently secured in West Virginia, are as follows: K. R. T. Herndon, C. C. Watts, R. G. Quarrier and J. W. Clarkson, of Charleston, and Joseph Renshaw, of Baltimore.

RAILROAD CONSTRUCTION.

Aberdeen & West End.—This North Carolina railroad is now finished to Troy, Montgomery County. Troy is about 10 miles beyond Condor, which is the northwestern terminus of the line now in operation. The extension reaches territory in which are some valuable gold mines. A large portion of the new work was quite difficult, steep grades and long bridges being necessary.

Addison & Pickens.—The grading on this new road in West Virginia is to be commenced this month. The survey has been made as already stated from the terminus of one of the divisions of the West Virginia & Pittsburgh at Pickens, southwest to Addison, W. Va., a distance of about 27 miles. So far only about five miles of this line has been located, but the engineers are making good progress and the contract will be given out at once. The work will be in charge of George M. Writescarer as General Manager, but the road when completed will be operated by the West Virginia & Pittsburgh.

Atlantic Coast Line.—The contract has recently been given out for building the short connecting line between Harlan City station or Elloree, the present terminus of a branch of the Charleston, Sumter & Northern, one of the divisions of this company, and the Manchester & Augusta road, near Rimini. The line will be only a little over six miles in length and will be built by Watkins & Hardeway.

Avon Park Transportation Co.—This company has recently completed five miles of road from Avon Park, Fla., north. The road will ultimately be extended to Midland and Haines City.

Bangor & Aroostook.—The officers state that it has been arranged to start the grading on the Ashland Branch within a few weeks. This branch will be 42 miles long and is an extension of the road from Oakfield, a station on the main line about 20 miles southeast of Houlton, north to Ashland on the Aroostook River, which is also crossed by the main line near Presque Isle. C. P. Treat, who has built the other portions of the road, will have the contract for this division.

Calumet & Blue Island.—The Chicago City Council has recently passed, over the veto of Mayor Swift, an ordinance authorizing this company to build a short line through South Chicago to reach the lake front. This ordinance has been under discussion for a number of months and has been the cause of a good deal of dissension. The railroad is one of the half dozen lines controlled by the Illinois Steel Co., and the object of the extension is to give that company better facilities for getting its products from the mills to the docks of Lake Michigan.

Chicago & Carbondale.—This road which has been building in southwestern Illinois to connect the Chicago, Paducah & Memphis with the Chicago & Texas has been practically all graded. The tracklaying was to have begun this week from the connection with the former line at Johnston City. The road is to be built to Carbondale, a distance of 18 miles. The contractors are Johnston Brothers & Faught, of St. Elmo, who built the Chicago, Paducah & Memphis road and are financially interested in the present line as projectors as well as contractors. The Chief Engineer is F. P. Read, also of St. Elmo, who has held that position on other roads built by this firm in the last few years.

DeKalb & Great Western.—The grading is now about finished on this short road in Illinois which is being built as a branch of the Chicago Great Western though maintaining a distinct organization. The contractors are Foley Brothers, & Guthrie, of St. Paul, who began working on the line in April last. It is about six miles long, starting from Sycamore, a station on the Chicago Great Western about 50 miles west of Chicago, reaching DeKalb on the Chicago & Northwestern.

Georgia Northern.—This company has recently built three miles of branch tram road from Barwick, Ga. The company expects to build 24 miles next spring, to Greenville, Fla., from Pidcock, Ga.

Hinton, New River & Western.—At an election held in Forest Hill and Greenbrier districts of Somers County, W. Va., last week, the voters of those districts voted favorably to the proposition to issue $40,000 bonds, the proceeds to be devoted to buying capital stock of the road. This makes $100,000, which has been subscribed to the capital stock of this company by districts through which it is surveyed to pass. President McCreery says that the work of building the road will now go on uninterruptedly. Proceedings will be instituted at once to secure by condemnation a part of the right of way wanted in Summers County, which is held by the Norfolk & Western Railroad. The surveys are about all completed and grading has been in progress for several weeks at points along the line. Mr. McCreery says that the company has been treated most liberally by nearly all the landowners and that there is now nothing in the way of the early completion of the road.

Illinois Terminal.—This company has been organized at Alton to build a freight road at that town connecting with the important industries in Alton. The incorporators are William Eliot Smith, R. H. Levis, Charles Levis, Harry N. Ferguson and George M. Levis, all of Alton.

Jacksonville, St. Augustine & Indian River.—The officers of this company are quoted as saying that the talked of line beyond the present terminus to Biscayne Bay will be put under contract at once. This line will be about 60 miles long and will extend from West Palm Beach, which is the terminus of the line built along the Indian River in 1893, along the East Florida coast to deep water at Biscayne Bay. When the line is extended to the latter town there is no doubt that steamers will be put on to connect with Cuba and other islands in the West Indies, which will bring this road, controlled by the Flagler interests, in competition with the Plant line, which at present operates steamers to the West Indies. Practically the entire line from a few miles south of St. Augustine will be parallel with water lines, the Indian River, which is navigable for certain classes of vessels, being followed from near Daytona to the Indian River inlet. The road then runs along the shore near St. Lucie Sound, Jupiter River and Lake Worth to West Palm Beach, and the extension south of that town will follow the coast closely, avoiding the Everglade swamps.

Kansas City, Watkins & Gulf.—The surveyors on the proposed extension of this road from Alexander, La., northeastward to Natchez, Miss., reached the Black River some time ago, and by this time have probably completed the preliminary line through to the end of the route. Chief Engineer Philbrick says that the line is much more favorable than he had expected.

Louisville & Nashville.—It is reported that this company is to build an extension into Tuscumbia, Ala., and that the contract for the grading has been let to J. T. Cross, of Chattanooga. Tuscumbia is across the river, about five miles distant from Florence, the southern terminus of the Nashville, Florence & Sheffield division.

McKeesport & Bellevernon.—Contractor McDonald, with a force of 100 men, has begun the grading on the extension from Bellevernon to Fayette City. The new road will occupy the township road for a mile out of Bellevernon, and the contractor is grading for a new township road to take the place of the old one. The company expects to have trains running to Fayette City by Sept. 1.

Monterey Mineral & Terminal.—This new road at Monterey, Mex., was put into operation on July 1 and is already handling a heavy traffic. It is 16 miles long, forming a belt line around the city of Monterey, reaching the silver smelters and giving them facilities for shipping their product to the coast. The road was built under the direction of J. A. Robertson, of Monterey, Vice-President of the company, who is also General Manager of the Monterey & Mexican Gulf road. The company operates under a West Virginia charter, the principal stockholders being residents of Baltimore and of England. W. Johnstown, of Liverpool, is President and C. K. Lord is Vice-President. The latter is also Vice-President of the Baltimore & Ohio.

Ohio, Sandy River & Elkhorn.—Surveys have been made for a line from White House, Ky., to Elkhorn, passing through Paintsville, Prestonburg and Pikeville, with numerous coal branches. A portion of the right of way has been purchased, as well as 50,000 acres of coal lands, which the road is intended to develop.

Patten & Sherman.—President A. A. Burleigh announces that the construction of this road, from the connection with the Bangor & Aroostook to Patten, will be begun at once. It is not the intention to let any contracts, but to have the work done by the company's own forces. The right of way has been secured and the road located from Sherman, Me., north to Patten, 10 miles.

Peninsula Construction Co.—This is the name of a company formed at Baltimore to build a railroad from Queenstown, Md., on the eastern shore of Chesapeake Bay southeastward to Rehoboth Beach, Del., on the Atlantic Ocean, about 60 miles. With a steamboat connection across the bay this would make a direct route from Baltimore to the sea coast. Mr. Edward Stabler, President of the Guardian Trust Co., Baltimore, is one of the capitalists interested.

Pennsylvania.—An extension of the Peter's Creek Branch, from its junction with the Monongahela Division at Peter's Station, Pa., 2½ miles, has been completed and opened for traffic as a part of the Monongahela Division.

Pittston Hard Rock Phosphate Co.—This company is said to be building 22½ miles of road from Fort White to Trenton, Fla. About 5½ miles of the line have been graded and some track has been laid. The road expects to do a regular freight and passenger business. Charles A. Goodyear is President.

Rumford Falls & Rangeley Lakes.—The extension beyond Rumford Falls, the present northern terminus of the Portland & Rumford Falls Railroad is now making considerable progress. About 15 miles of track has been completed north of Rumford Falls and the line is practically graded for about five miles further. This completes the contract of Ward Brothers, Kennebunk, Me. The work beyond Houghtons, which is the terminus of this contract, to Rangeley Lakes, is being done by Nelson & Rehil, of Dunellen, N. J. This division of the road will be about nine miles long and is the only additional construction work which will be undertaken this year. It is expected ultimately to build the road through to Megantic to connect with the Quebec Central line, but that work will not be undertaken for some time.

Savannah, Americus & Montgomery.—Since the road was purchased recently at foreclosure by representatives of the bondholders, the suggested extension into Savannah has been considerably talked about, and it is now asserted that contracts have been made with the Carnegie Steel Co. for the rails for a portion of this new line. What length of line it is proposed to build at the present time we are unable to learn.

Sheboygan, St. Paul & Central.—The contract for building the first section of this road southwest of Sheboygan, Wis., which is located on Lake Michigan, north of Milwaukee, is reported let to Bick & Bland, of Toledo, and the Crowley Construction Co., of the Portland Block, Chicago. The work now under contract will bring the road to Random Lake, a small station 22 miles south of Sheboygan. The road has been located all the way between the tracks of the Chicago & North Western and the Chicago, Milwaukee & St. Paul, finally connecting at Random Lake with the latter road.

Southern National.—This company has been incorporated and organized for the construction and operation of a railroad from Chattanooga, Tenn., via Rossville to Chicamauga National Park, in Georgia. The dedicatory exercises of the Park are to be held in September next, and will continue three days. The attendance will probably be very large, and the present means for reaching the park are inadequate. The proposed new line will be about nine miles long. Preliminary surveys and estimates have been made. The President of the Company is Mr. James R. McFarland, and the Secretary Mr. R. B. Stogall, both of Rossville, Ga.

Southern Pacific.—The contractors on the Coast line, which is being built south of San Luis Obispo, are reported to have received orders to increase the number of men on the extension of the line and to push the work vigorously. Heretofore only a small force of men has been employed and work has gone on slowly, on account of the difficulties of construction, and also because the railroad company had no reason to hurry the work. The engineers have selected foundations for the bridge at the mouth of the Santa Ynez River at a depth of 70 ft., and the erection of this bridge will now go on rapidly. As stated two weeks ago, the work was under contract to that river, that point being about 50 miles south of San Luis Obispo. The present end of track is about midway between these two points.

Terre Haute, Olney & Chester.—It is reported that surveys have been made and the right of way secured for a road from Mt. Vernon to York, and surveys will shortly be completed to Terre Haute, Ind. The entire length of the road will be 125 miles, 100 of which is in Illinois.

Toledo, Ann Arbor & North Michigan.—This company has secured the right of way for a new line from Hamburg to Hamburg Junction, Mich., 3⅛ miles, and also for a new line from Howell Junction, Mich., one mile long. It has also laid 3½ miles of track on the Lake George cut-off and also on that from Temple to Clarence, Mich. A further cut-off is being constructed from Ann Arbor to Whitmore Lake, a distance of 7½ miles. All these lines are being built to eliminate bad curves and grades.

Tuscarora Valley.—The track is now being laid on the extension of this line from East Waterford, Pa., through the Path Valley, which was begun early in the spring. The line now building will be only 10 miles long, the present intention being not to build beyond Blair's Mills. This is about nine miles from Dry Run, which is proposed as the final terminus of the extension.

West Virginia Central & Pittsburgh.—Several mill proprietors are building new lumber railroads, which will be valuable feeders to this road. Messrs. Dewing & Sons, who own large areas of timber land on the Cheat River, and from which the logs have heretofore been taken by river to the mills at Point Marion, Pa., have arranged with the W. V. C. & P. for the construction of a branch about five miles long to open these lands. The road will start near Elkins. Messrs. Dewing will build a mill on the line of the West Virginia Central. Messrs. Weese & Sons, of Elkins, W. Va., are at work on a new railroad from their mills at Elkins to their timber land about five miles from the town. The J. L. Rumbarger Lumber Company, of Elkins, is building a three-mile railroad from its mills to a tract of timber land in Maryland, which has not heretofore been touched. These roads will be standard gage.

West Virginia, Ohio & Western.—This road was partially described in the *Railroad Gazette* a few weeks ago. The line has been laid out along Bingammon Creek from the West Virginia & Pittsburgh road in Harrison County, W. Va., as far as Buffalo Creek, near Logansport. From this point it will go over into Wetzel County on a direct line toward the Ohio River, where it joins the Ohio River Railroad, and thus make a connection with the Pennsylvania lines; the Chesapeake & Ohio, and the Toledo & Ohio Central. The original route from the line of ths West Virginia & Pittsburgh to the Wetzel County line was abandoned, although it would have been cheaper. The new line selected will develop some fine coal and timber land through which it passes, and is so located that a branch can be built into the Mannington oil field, which is desirable. This branch will also provide a well located connection with the Baltimore & Ohio.

West Virginia Short Line.—The Circuit Court of Wetzel County, W. Va., sitting at New Martinsville, last Friday, heard the application of the representatives of this company, which proposes to build a railroad from a connection with the Baltimore & Ohio, in Harrison County, W. Va., to the Ohio River, at New Martinsville, for the appointment of Commissioners to assess the damages due certain landowners whose lands the railroad seeks to condemn, along the line of Fishing Creek, in Wetzel County. Eight Commissioners were appointed, to take charge of eight cases which have been brought. The road is to pass through the county a distance of 88 miles, and in but three instances has it failed to get the right of way for nothing, or at nominal cost. Representatives of the road hope to begin the work of construction within a few weeks, all the surveys and locations having been made.

West Virginia Southern.—A charter for this company was secured in West Virginia last week with a capital placed at $500,000. Joseph Renshaw, of Baltimore, is the principal stockholder of the new company. It is proposed to build a line from a connection with the Chesapeake & Ohio at Brownstown, W. Va., through the Coal River Basin in West Virginia, which has important mineral deposits and has valuable timber lands. Mr. Renshaw and those associated with him recently purchased the franchises and right of way of the Coal River road, which has been promoting a road through the Coal River district for the last two years or more. The new owners claim that 40 miles of road will be completed by next spring. Some account of the route over which it is proposed to build was given in our issue of July 5, page 455.

Whippany River —The tracklaying is just beginning on this short road, which was organized to build an extension of the Rockaway Valley road from Morristown N. J. The new line is to extend to Whippany, N. J., about four miles east of Morristown. J. E. Melick, General Manager of the Rockaway Valley road, which will operate the branch when completed, is Chief Engineer of the new line.

Wiscasset & Quebec.—Construction work has begun this month on the extension of this 2 ft. gage road, which is being built north of Week's Mills. The road has been in operation to that point all of this year. It is 28 miles north of Wiscasset, on the coast of Maine, and the work now being done is to extend the line to Albion, about 15 miles north of the present terminus. Already 5 miles of track has been laid north of Week's Mills. J. P. Tucker, of Wiscasset, is Superintendent and is in charge of the work now going on.

Yankton, Norfolk & Southwestern.—A press dispatch from Yankton, S. D., says that the English capitalists interested in this road have decided to go ahead and finish it, and will soon let contracts for the grading and tracklaying that is yet to be done. This line was started two years ago, and about 20 miles of track was reported as laid at that time. Financial difficulties caused a suspension of work. Later it was reported that the chief officer of the company had defrauded the English stockholders by means of spurious bonds. The line is from Yankton, S. D., south about 60 miles, to Norfolk, Neb.

It is also reported that the proposed bridge across the Missouri at Yankton will be built, although that project is independent of the railroad company.

GENERAL RAILROAD NEWS.

Altoona, Clearfield & Northern.—The receivers in charge of this road were discharged on July 15 by the Blair County (Pa.) Court, and an order was issued directing the transfer of the property to the Board of Directors. This company has been in the hands of receivers for three years past. New stock has been subscribed, and it is said that the company will now pay its indebtedness in full.

Boston & Maine.—The state of New Hampshire has sued the Manchester & Lawrence to recover $750,000, being the amount of money earned by that road in excess of 10 per cent. per annum which it is claimed belongs to the State under the provisions of the road's charter. This road is operated by the Boston & Maine, to which it was leased in 1887.

Central of Georgia.—The deposits of securities under the plan of reorganization proposed by Messrs. Samuel Thomas and Thomas F. Ryan, have been sufficient in amount to warrant the declaration that their plan of reorganization has become operative.

Chattanooga Belt.—This company has been organized to operate lines of the Chattanooga Union road at Chattanooga, Tenn., these various lines aggregating 43 miles. The Chattanooga Union property was recently sold at foreclosure, and was purchased by representatives of the Alabama Great Southern, which has had control for some years. As the Southern Railway is now operating the Alabama Southern, this purchase is practically by the Southern Railway, and will give that company valuable and well located terminals at Chattanooga. Besides the belt line around the city a number of local lines to suburbs are operated, and it is the intention to equip some of these lines to be operated by electricity.

Chattanooga Southern.—A charter was granted under the general law of Georgia last week to the Chattanooga Southern Railroad Company. The incorporators are Henry A. V. Post, Chairman; Russell Sage, Thomas H. Hubbard, Henry L. Lamb and Newman Erb. The road, which was formerly the Chattanooga Southern Railway, was sold at Gadsden, Ala., in February last, under a mortgage foreclosure, and was bought in by the trustee of the bonds, the Central Trust Co. of New York. The road extends from Chattanooga to Gadsden, Ala., 92 miles. This information should have appeared under this heading last week, but the item in which the news was given appeared as relating to the Long Island, to which, of course, it had no relation.

Chicago & Northern Pacific.—Judge Jenkins, of the United States Court, in Chicago, has granted an order directing Receiver A. L. Hopkins to enter into possession and operation of the road, and he has accordingly taken possession of the property heretofore operated by the Wisconsin Central Company. J. Edward Simmons, Chairman of the Bondholders' Committee, points out that the property, being free from the control of any other corporation, will, for the first time, be able to show its actual earning capacity, and can now be developed without regard to conflicting interests. This will, it is hoped, enable the bondholders' committee to put forth, in the near future, a detailed plan of the reorganization of the property.

Chicago, St. Paul & Kansas City.—The Supreme Court at New York last week announced a decision affecting the reorganization of the company, in overruling the demurrers interposed to the complaint in the action brought by James H. French, the owner of certain bonds of this company and the Minnesota & Northwestern to have the scheme for the reorganization declared illegal and void. The suit was brought a year ago to have the plan for the reorganization of the Chicago, St. Paul & Kansas City, by the lease to the Chicago Great Western, and the substitution of the stock of the latter company for the securities of the St. Paul company and of the Minnesota and Northwestern adjudged illegal and the lease declared void. Demurrers were interposed to the complaint, on the ground that the court had no jurisdiction of the action, that the suit to obtain the relief demanded could only be maintained by the trustees of the mortgages, which had consented to the reorganization, and that the complaint did not state facts sufficient to constitute a cause of action. The court overrules these demurrers, holding that the complaint does state facts sufficient to constitute a cause of action.

Duluth & Winnipeg.—Stockholders of the road holding stock to the value of $125,000 have begun suit to prevent the sale of the road as proposed by the bondholders and the purchase of the property at such sale by that interest. This action is brought in the form of a cross bill, and the bill is filed upon the authority of the Court permitting an intervention by the stockholders against the sale of the road. The stockholders state that a portion of the present bond issue is not valid.

Galveston, La Porte & Houston.—The Texas railroad commission has authorized the company to issue bonds to the amount of $700,000. The authority carries with it the cancellation of all outstanding stock, bonds and securities of the North Galveston, Houston & Kansas City and the Galveston, La Porte & Northern, which have been consolidated to form the Galveston, La Porte & Houston.

Illinois Central.—The earnings of the company for the 11 months to May 31, 1895, as compared with the previous year are shown in the following table:

	2,888	2,888	Dec.
Miles operated			
Gross earn. from traffic	$17,548,067	$19,320,128	$1,772,061
Oper. expen. and taxes	12,190,654	13,289,083	1,098 429
Net earn.	5,357,413	$6,031,045	$673,632

The gross receipts from traffic for the month of June, 1895, are estimated at $1,499,367; the receipts for June, 1894, were $1,337,336, the estimated increase being $162,031.

Long Island.—A notice of the formation of a new company to operate the Chattanooga Southern road was erroneously inserted under this head in this column last week. This road is paying regular dividends, and the item could have misled no one. It was one of those curious errors which sometimes gets into a paper in spite of diligence.

Louisville & Nashville.—The company makes the following report of earnings for the year ending June 30, the last month estimated:

	1895.	1894.	Changes.
Gross earn.	$19,263,677	$18,974,337	Inc. $289,340
Oper. exp.	12,239,519	11,863,785	Inc. 375,734
Net earn.	$7,024,158	$7,110,552	Dec. $86,394
Fixed charges	5,588,381	5,665,636	Dec. 77,255
Net income	$1,435,777	$1,444,916	Dec. $9,139
Other income	363,273	272,288	Inc. 90,985
Total income	$1,799,050	$1,717,204	Inc. $81,846
Total deductions	1,065,556	164,713	Inc. 900,843
Surplus	$733,494	$1,552,491	Dec. $818,997

The total deductions include: Loss on Georgia Railroad, $100,000; loss on other roads, $86,000; sinking fund payments, $587,264; less market value of securities received for a part thereof ($412,264) $175,000; unfunded discount, $6,887; balance advances to South & North Alabama, $697,669—a total of $1,065,556.

North Carolina.—At a meeting of the directors of this road held at Greensboro, N. C., last Friday, President L. S. Overman tendered his resignation, and ex-Congressman Sidney B. Alexander, of Charlotte, N. C., was elected to succeed him. P. B. Ruffin was re-elected Secretary. The following Board of Directors has been appointed by the Governor for the ensuing year: S. B. Alexander, L. S. Overman, J. P. Allison, C. W. Johnson, J. J. Young, V. E. Turner, F. S. Spruill, C. W. Maxwell. The annual meeting of the stockholders was to have been held at the same time and place, but failed for the lack of a quorum. This makes three successive annual meetings at which it has been impossible to secure the attendance of a quorum of the stockholders.

Ogden & Hot Springs.—This railroad, extending from Ogden north to Hot Springs, a distance of about 7½ miles, was sold at sheriff's sale at Ogden, Utah, on July 10. The property was purchased for $24,957 by W. A. Paxton, of Omaha, who is President of the company and has been operating it as Receiver for the past year or two.

Pennsylvania.—The loan recently negotiated with Speyer & Co. was largely oversubscribed when offered by the bankers for public subscription in London. This loan is for $5,000,000 and bears the low interest of 3½ per cent. The subscription price was above par.

Pittsburgh, Cleveland & Toledo.—The stockholders of the company, at the special meeting at Youngstown, O., on July 12, voted to approve a $4,000,000 mortgage, the bonds bearing 4½ per cent. interest, and thereby retire the present $4,000,000 mortgage; also to purchase the Trumbull & Mahoning Railroad for $365,000, and to pay off all the company's debts and improve the road, as stated some weeks ago, when the meeting was called. The road is a leased line of the Pittsburgh & Western.

Rockaway Valley.—The foreclosure sale of this road on June 15, under the mortgage held by the Farmers' Loan & Trust Co., of New York, was poorly attended, and the property was sold to J. F. & J. N. Pidcock, for $30,000. The road extends from Whitehouse to Morristown, N. J.

Tennessee Midland.—Commissioners have been appointed by Judge Lurton, of the United States Circuit Court at Memphis, to conduct the sale of this road, which will be held within 60 days. The application for foreclosure was made by the St. Louis Trust Co., the trustee of the first mortgage bonds. The road was built about six years ago, and is now operated by the Paducah, Tennessee & Alabama road from Memphis to the Tennessee River, about 135 miles. The connection with that road is made at Lexington, Tenn., a few miles east of the terminus at the Tennessee River. The order for the sale of that road, which is being operated by a receiver, will be made in a few days.

Toledo, Ann Arbor & North Michigan.—A press dispatch from Grand Rapids indicates that the Escanaba, Frankfort & Southeastern, which forms the northwestern end of the main line of this road, has been restored to the system, the Reorganization Committee having bought it from the new owners for $210,000. This 23-mile section was formerly the Frankfort & Southeastern. The mortgage upon it was foreclosed and it was sold last month, being bid in by the bondholders at $100,000.

The second sale of this property to R. C. Martin, of New York, Chairman of the Bondholders' Committee, will be opposed like the first sale by certain interests of the company. A motion has been made on behalf of certain stockholders to set aside the recent sale of the road. The chief contention is that the property owned by the company in Ohio was not sold separately from the other divisions of the railroad.

At Cincinnati, July 16, Judge Taft, in the United States Court, overruled the motion to set aside the sale of the road. The motion was made by the Farmers' Loan & Trust Company of New York, against the purchasers.

Valley (Ohio).—Notice is given by the Reorganization Committee appointed under the agreement of Feb. 28, 1895, that, with the consent of the Baltimore & Ohio Railroad, it has made a modification of the plan of reorganization by increasing the 4 per cent. 100-year guaranteed bonds from $5,500,000 to $6,000,000. The Reorganization Committee, representing Baltimore & Ohio interests, has represented a majority of $2,400,000 first mortgage sixes. The efforts of this interest to secure foreclosure have heretofore been resisted in the courts by the Wheeling & Lake Erie people, who represented a majority of $1,600,000 sevens. The trouble was tided over at a recent meeting in New York, at which it was agreed that the sevens should be turned over to the Baltimore & Ohio interest, and that there should be amicable co-operation in foreclosure proceedings with the least possible delay.

The increase in the proposed issue of bonds was made to provide funds for extending and improving the terminal facilities at Cleveland. All differences between the Baltimore & Ohio and Wheeling & Lake Erie interests have been amicably settled and legal proceedings instituted in the dispute between these interests have been withdrawn. This road gives the Baltimore & Ohio an entrance to Cleveland, where that company owns terminal property, the Valley road also owning valuable property there.

TRAFFIC.

Traffic Notes.

The cool weather has played great havoc with the watermelon traffic. At Louisville, Ky., last week a single firm had 38 cars of melons in the Louisville & Nashville yards which it was difficult or impossible to sell.

The Wabash started its new fast mail train between St. Louis and Kansas City on July 14. The eastbound train leaves Kansas City at 6:20 p. m. and reaches St. Louis at 2:30 a. m., connecting with the new train eastward over the Baltimore & Ohio Southwestern. It is said that letters mailed at San Francisco in the afternoon will now reach Washington 24 hours earlier than before.

The Cleveland, Cincinnati, Chicago & St. Louis and the Missouri, Kansas & Texas have made an agreement to exchange traffic over the Alton and Bellefontaine bridges. Under this arrangement through freight between the East and the Southwestern States will be taken across the Mississippi without going through St. Louis. It is said that large shipments of cotton and live stock have already been contracted for.

It appears that the trouble with Christian Endeavor excursion tickets at Chicago was patched up so as to get the passengers through all right, but a second difficulty arose in the failure of the Boston roads to establish a joint agency to stamp the return portions of tickets. This neglect led the Erie to sell tickets with the privilege of returning without the Boston stamp, and the other lines say that by this means the Erie secured an unreasonably large share of the business from Chicago. It was finally arranged to have the tickets stamped by agents of the individual roads at Boston, but it remains to be seen how many tickets the New York and Boston scalpers will get hold of.

The reduction in passenger rates on the main line of the Pennsylvania Railroad, between Philadelphia and Downingtown, noted last week, is principally in single fares and two-day excursion rates. There is no change in the price of 60 or 180-trip tickets. The rate per trip by purchasing the new 100-trip tickets will be a little higher, with the advantage that this ticket will be good for a year. These tickets can be used only by the person whose name appears on them. The company will also issue packages of 10, which can be used by any one. Following are the rates from Philadelphia to the more prominent stations:

	Miles.	Old rate, single.	Old rate, excursion.	New rate, single.	New rate, excursion.	10-ride.	100-ride tickets.
Overbrook	5.5	.17	.28	.14	.22	$1.00	$8.70
Ardmore	8.5	.26	.43	.21	.34	1.53	10.50
Bryn Mawr	10.2	.31	.51	.26	.41	1.85	12.00
Wayne	14.6	.44	.73	.37	.58	2.61	14.10
Paoli	19 9	.60	1.00	.50	.80	3.60	17.40
Downingtown	32.4	.98	1.62	.81	1.30	5.85	24.90

Chicago Traffic Matters.

CHICAGO, July 17, 1895.

Eastbound shipments last week show a considerable increase, notwithstanding the reporters figured out that a strict maintenance of rates would cause a decrease. Consequently they are now trying to explain it by finding "rumors" of rate cutting, in spite of the last agreement to maintain rates. Traffic officials claim that the agreement is being faithfully lived up to and that the increase is due to natural causes, and they are very likely right.

Lake shipments, on the contrary, were light and rates were lower, the 1 cent rate on grain to Buffalo not being maintained, most of the grain going forward at ⅞ of a cent a bushel.

It is not probable that any great demoralization will grow out of the Christian Endeavor excursion. Of course, there will be a few tickets in the hands of the scalpers, but the general impression is that the roads will act in good faith regarding the conditions under which the tickets were issued. Some of the lines did not follow the regulation printed form in issuing tickets, thereby laying themselves open to charges which every line is too free to make, that they intentionally ignored the provisions of the association circulars. The chairmen of the Western and Eastern associations are co-operating to keep the return portions of the tickets strictly within the regulations, and are hopeful that with the assistance of the Boston roads that they will be able to do so.

At the regular meeting of the Freight Committee of the Central Traffic Association held here last week the officials present passed a resolution, to which each affixed his signature, that from July 22 they would absolutely maintain published rates until ten days after written notice, &c. At the same meeting further consideration was given the subject of establishing a uniform scale of rates in association territory, from five to 450 miles, to be used in lieu of the various scales adopted by the Eastern lines in 1887. This subject has been before the association for the last three years, and it has now been referred to the local committee for final report at the September meeting, when it is probable that such a modification will be recommended.

About the only action of importance taken at the meeting of the Western Freight Association at Lake Minnetonka was the decision not to advance rates on agricultural implements and stoves. The rates were reduced from 2d to 3d class last year with the understanding that they would be put back July 1st.

Texas passenger troubles are in a fair way to be smoothed out unless something new develops before the present plans can be carried into effect. An agreement has been reached between the Houston, East & West Texas and the Southern Pacific; the Texas & Pacific offers to redeem any round trip tickets found on the market from Dallas to New York; the Pennsylvania repudiates the alleged action of the former in issuing or making any cut rate over its line, and the Missouri, Kansas & Texas agrees not to retaliate from Dallas to St. Louis. The only fracture open now is apparently the one caused by the excursion rates between Texas points and St. Louis and Chicago, and there seems to be a disposition to stop the rate cutting with the termination of these excursions. It is pretty hard to fix the responsibility for the demoralization, as each line persists in crying "wolf."

The live stock traffic of the Western roads for the six months ending June 30 makes a fair showing. There was a reduction from the previous year of 15,406 cars, but from 1893 of only 1,246 cars, and as compared with 1892 of 26,671 cars. Roads showing gains were Illinois Central, 77 cars, and Wabash, 846 cars. The largest decreases were Chicago & Northwestern, 6,296, and Chicago, Burlington & Quincy, 4,375 cars.

The shipments of eastbound freight, not including live stock, from Chicago, by all the lines for the week ending July 13, amounted to 63,873 tons, against 56,946 tons during the preceding week, an increase of 6,927 tons and against 4,142 tons for the corresponding week last year. The proportions carried by each road were:

Roads.	WEEK TO JULY 13.		WEEK TO JULY 6.	
	Tons.	p. c.	Tons.	p. c.
Michigan Central	5,980	9.3	4,491	7.9
Wabash	5,545	8 7	3,667	6.4
Lake Shore & Mich. South.	6,921	10 8	8,705	15.3
Pitts., Ft. Wayne & Chicago	9,700	15.2	7,991	14.0
Pitts., Cin., Chi. & St. Louis	6,134	9.6	5,209	9.2
Baltimore & Ohio	5,859	9.2	3,477	6.1
Chicago & Grand Trunk	3,570	5 6	5,470	9.6
New York, Chic. & St. Louis	11,418	17.9	10,235	18.0
Chicago & Erie	6,364	10.0	5,645	9.9
C., C., C. & St. Louis	2,382	3.7	2,056	3.6
Total	63,873	100.0	56,946	100.0

Of the above shipments 1,749 tons were flour, 30,103 tons grain and mill stuff, 12,701 tons cured meats, 6,056 tons dressed beef, 2,813 tons butter, 1,467 tons hides, and 6,281 tons lumber. The three Vanderbilt lines carried 38 per cent., the two Pennsylvania lines, 48 per cent.